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EXAMINATION AND TREATMENT OF THE
EUSTACHIAN TUBE BY THE AID OF
THE NASOPHARYNGOSCOPE.*

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At a meeting of the Eastern Section of this Society in February, I presented an instrument which I had perfected for the examination and treatment of the epipharynx and eustachian tubes. I demonstrated the instrument, which I named the nasopharyngoscope, by showing 17 patients, each having a different pathologic condition in and about the eustachian tubes.

I gave a brief preliminary report of the use of the instrument in the examination of the posterior portion of the nose, the nasopharynx and the eustachian tubes; also described briefly the method of direct treatment of the tubes under the guidance of vision made possible by the nasopharyngoscope. I gave the results of this treatment upon the tubes, and also

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upon the aural lesions caused by the pathologic condition of the tubes.

At that time I believed, as I had been informed by the manufacturers, that the instrument would be ready and in the hands of many of the fellows of this society within ten days, but owing to an error in the lens grinding, the first order was not satisfactory. This caused a long delay, and it has been a severe disappointment to me. It has detracted much from the present value of this paper, as I had hoped that many of our fellows would have had three or four months' study and experience, so that much could be added to our knowledge of the subject.

At the Eastern Section I promised to give a more complete report at this, the annual meeting.

We realized at the beginning of the work that it would require a vast amount of study before the anatomic variations, physiologic and pathologic, could be understood, for there are as many and marked variations in the size and shape of the eustachian tube as there are in the structures of the nose, or in other parts of the body. We have to learn how far in any case variations can exist without producing any effect upon the physiologic functions of the tube, and indirectly upon the ear. Were it not for the resulting aural complications, pathologic conditions of the eustachian tube would be of little importance. But it is a fact that over 90 per cent of all the diseases of the middle ear are due to disease primarily in and about the tube. We find cases where a slight swelling or deformity in or about the eustachian tube produces marked middle ear signs and symptoms, and again we have more pronounced and severe pathologic conditions of the tube without marked if any change in the middle ear. As we study these cases more thoroughly, and as our knowledge increases, we find in many of them the causes for the variable associations. There are so many local pathologic conditions to study and classify, so many degrees of resulting effect upon the ear, so many possibilities for various lines of treatment and so much to learn concerning the results of treatment, that it will take many months of individual and concerted study before we can speak with any degree of authority concerning this subject. This paper, therefore, is simply a record of the work thus far accomplished.

I have now examined with the nasopharyngoscope over 900 cases, and have classified 409 cases. I have also examined 64 cases, some of whom came to the eye clinic and gave no symptoms of catarrh in the nose or ear. We examined the latter cases to learn the conditions of the nose, epipharynx and tubes in cases giving no symptoms of nasal or aural disease. All the cases classified in this report were taken as they came for examination and treatment. I would have liked to have had an examination of the heart, lungs and kidneys in every case. It would also have been of importance to have had a bacteriologic examination of the secretion in the nasopharynx and ear. I found it impossible to examine and treat a large number of cases and have all of these examinations made. In every case the usual examination of the nose, the throat and the ear were made. The posterior portion of the nose, the epipharynx and the eustachian tube were also examined with the nasopharyngoscope.

To obtain the best results in examining the nose and epipharynx with this instrument, cocain should be applied to the lower inner wall of the inferior meatus of the nose. This is best accomplished without affecting the mucous membrane of the epipharynx by using a cotton-tipped wire applicator. When this area has become anesthetized the tube of the 'scope is passed through the lower fossa close to the septum. The fenestra of the instrument is directed upward until the epipharynx is reached, when it is rotated toward the opposite side. By advancing and rotating the instrument all of the structures in the nose and epipharynx can be brought into view. It is possible to examine every case in which a small eustachian catheter can be used, and in any case so deformed that this instrument cannot be used some nasal operation is absolutely necessary for other reasons than examination. The same statement is true in regard to the use of instruments for treatment. It would be useless to attempt any treatment and foolish to expect any lasting results in any case of epipharyngeal and aural disease where there was such deformity of the nose as to block either nasal passage.

For the treatment of the eustachian tube the 'scope is carried through the opposite side of the nose from that of the tube to be treated, and when the area of the tube is brought into view the instruments for treatment are carried through

the side of the nose corresponding to the tube to be treated.

I have devised applicators for the epipharynx as well as for the lumen of the tube, and have made forceps and curettes which I have found to work satisfactorily in removing growths in and about the eustachian tube. I have also designed a syringe for carrying liquids into the tube, but have not as yet had sufficient experience with it to know of its value. In making applications into the tube much care should be used so as not to injure the mucous membranes. This I believe to be of great importance, for bruises or abrasions will result in a condition worse than we are endeavoring to relieve. I have found the cotton-tipped bougie to be of great service and to produce all the good results possible to be obtained with others, without the poor results which sometimes follow the use of other instruments.

In all cases of severe, acute or chronic inflammation of the eustachian tube with much swelling and occlusion, we have been careful to make our first applications in and about the orifice of the tube only, and have not carried them into the tube until we were sure of drainage at the orifice. We have tried and are now using various solutions, but have found that a solution of argyrol has produced more marked results without producing any injurious effects than any other drug. There have been a few cases where silver nitrate solution has apparently been of great service, but in some cases the reaction has been too marked, and until our knowledge is greater I believe we must use this drug with considerable care.

Adhesive bands and growths in the lateral fossæ can usually be easily removed by the curette, but occasionally we meet tissue so hard that a cutting forceps is necessary. Soft bands can be broken by the finger, but we have found that they are much more liable to readhere than when removed by the curette or forceps.

In the cases of hypertrophy of the posterior end of the turbinate we can now see just where to adjust the snare and can remove as much and only as much as we wish. The posterior end of the lower turbinate quite frequently presses upon the anterior border of the eustachian tube, and many of these patients complain of a rumbling tinnitus which is often relieved as soon as a portion of the hypertrophy is removed.

As in other mucous membranes, all degrees of inflammation

from the slightest injection to the most intense swelling are found. In some cases the tube is practically obliterated by an edematous swelling. We have occasionally found atrophy with the formation of crusts in the tube, giving the appearance of atrophy of the pharynx. In suppurative middle ear disease, pus is frequently found in and discharging from the tube. The mucous membrane on the floor and anterior wall of the tube swells more easily and to a more marked degree than that of the rest of the tube. At times the floor nearly fills the lumen of the tube.

In acute inflammations the mucous membranes may be as injected and swollen as in chronic cases, but the acute cases are more frequently reduced temporarily by cocaine and adrenalin, while the chronic cases are much less affected by these drugs.

Growths in Rosenmüller's fossæ and upon the cushion of the tube are comparatively common, but within the tube they are rare. I have found but two. One of them completely filled the lumen of the tube and was attached to the floor posteriorly. It was found to be a myxoma.

Adhesions between the cushion of the tube and the posterior boundary of the lateral fossa of the pharynx are common and are often productive of aural symptoms, especially tinnitus. Adenoid tissue commonly fills the fossa and quite frequently is found extending to the cushion of the tube, and in a few cases even extending into the lumen of the tube. In children large adenoids not only press upon the cushion of the tube but greatly restrict its movements. In many cases the lumen of the tube is covered during deglutition. Adenoid tissue in the adult is much more frequently extensive in amount and a source of trouble to the tubes than is indicated by the posterior nasal mirror. We have found two cases of posterior nasopharyngeal abscess. One of these cases, in a man of 27 years, although causing pressure upon the cushion of the right tube, did not show in the posterior nasal mirror, and gave simply a spongy feel to the finger. Dr. Emerson, who saw the case with me, questioned the diagnosis. The abscess was opened through the right nostril and fully a dram of pus was evacuated. We failed to get a culture, although the swab was carried into the abscess cavity.

Another abscess, situated centrally in the epipharyngeal

vault just behind the base of the vomer, was found in a girl of 19 years of age. It was about the size of a small grape and appeared similar to an adenoid growth in the nasopharyngeal mirror. The nasopharyngoscope showed that it was probably an abscess. It was opened through the nose and about half a dram of pus evacuated. The pus was very thick and showed a mixed infection. This patient sought relief from a thumping tinnitus of several months' duration in both ears. The eustachian tubes were somewhat inflamed, but were apparently free. There was considerable restriction of motion. The membranæ tympanorum were apparently normal. The tinnitus subsided in five days after the abscess was opened, and there were no symptoms at the end of the month, when the last examination was made.

Among all the cases I have examined, hypertrophy of the posterior end of the turbinate was found in 54 cases. In 17 of these cases the turbinate was so large as to press upon the anterior lip of the tube, and in one case nearly the whole tube was covered by a large lower turbinate.

In a case of severe and protracted tinnitus in a man of 32 years who had been treated without relief for several years, a very large lower turbinate pressed upon the anterior wall of the tube, while an adenoid about the size of a marble rested upon the cushion of the tube. The mucous membrane of the whole tube was swollen, injected, and granular. The middle ear showed a typical chronic inflammatory process. Removal of the adenoid and turbinal hypertrophy was followed by some improvement, but as the symptoms were quite severe at the end of six weeks, treatment of the tube was begun, and in five weeks the symptoms had disappeared.

Two cases of epipharyngeal polyps were found; one of these nearly filled the epipharynx and entirely covered the right eustachian tube. The other polyp was smaller but also covered the right eustachian tube. This was attached by a small pedicle to the posterior end of the middle turbinate.

Swellings in and about the lateral fossa may seem to be of little importance until the patient swallows, then there is often shown to be a marked restriction of the movement in and about the eustachian tube.

In chronic suppurative sinusitis of the nose, the mucous membrane of the epipharynx and eustachian tube is frequently

of the same beefy appearance as that of the posterior pharyngeal wall. Purulent crusts are often in the lateral fossa and sometimes in the lumen of the tube.

Cardiac and renal diseases often produce that condition of passive congestion which we find in the other tissues. We have been unable to obtain any apparent results from local treatment in this class of cases.

In cases of gouty diathesis we have generally found angry-looking swollen mucous membranes. There is the same general appearance of the whole epipharynx and eustachian tube which we so frequently find in the pharynx and larynx.

Chronic indigestion and constipation frequently produce a condition of the epipharynx resembling the gouty type.

I have found but one case of diphtheritic membrane, and in this case the membrane covered the posterior ends of the turbinate and much of the epipharynx, even extending over and into the right eustachian tube. In the right ear was a very severe acute suppurative process. The Klebs-Loeffler bacillus was present, both in the epipharynx and in the pus from the middle ear.

We have seen two cases of syphilitic disease of the epipharynx; one a mucous patch on the floor of the tube, and the other an ulceration between the lower turbinate and the anterior lip of the tube. Both of these patients showed other manifestations of syphilis and both cases absolutely healed under mercurial treatment.

It would take far more time to adequately describe the cases of acute middle ear with bulging membranes than I can give to this whole series. I have, therefore, tabulated these cases as correctly as possible to give a general idea of the conditions and results and will here simply briefly review the chart.

For the same reason the other cases are here briefly reviewed, but I hope later to present a more complete study of the various conditions, giving a separate paper for each class.

In all there were 31 cases of acute secreting middle ear. The youngest was 6 years old, and the oldest was 64. The attacks varied from a few hours to several days. All of the cases when examined showed bulging membranes, and would have ordinarily been incised. They were all treated by applying cocain and adrenalin to nose, nasopharynx and eustachian tube, and after a few moments applying argyrol to the lumen

of the tube. As you will see by examining the chart, the majority of the cases were relieved of the distressing symptoms as completely as by paracentesis, and nearly all were saved a discharging ear. The convalescence was also much shorter than in similar cases where paracentesis is performed. There were only two cases which were not relieved. One of these, No. 7, was at first relieved and suffered a relapse; three days later the membrane ruptured.

In case No. 13, I was unable to obtain relief of signs or symptoms, so I performed paracentesis.

What must now be done is to observe simultaneously an equal number of cases with and without this line of treatment, the untreated cases acting as controls. There must also be a bacteriologic examination of all secretions. It was impossible for me to investigate this series as thoroughly as I would have liked, as there were so many cases to examine and study. I am now studying cases of acute purulent middle ear and rupture of the membrane, and although to this line of cases I have not as yet given sufficient study to draw anything like definite conclusions, I am of the opinion that we are gaining much in treating the tube while we are treating the middle ear. A patent tube, if possible to obtain, must help to drain the middle ear as well as to prevent added infection from the epipharynx. If we can restore and maintain the function of the cilia of the tube we have, I believe, gained much.

We have classed all of the suppurative cases with perforation of the drum membrane as acute when they have not discharged six weeks, and as chronic when they have discharged longer than six weeks. In a large number of these suppurative cases there was adenoid present in the epipharynx. In nearly all the mucous membrane of the tube was swollen. In some it was of a granular appearance. In a few pus could be seen coming from the tube.

We have treated 26 cases of acute suppurative middle ear with ruptured membranes without signs of mastoid complication, and 8 cases which showed mastoid involvement. These cases had discharged from a few hours to six weeks. The youngest patient was 4 and the eldest was 68 years of age. In nine cases both ears were suppurative.

Among those 43 suppurative ears there were all degrees of severity, and the length of time from the beginning of treat-

No.	Age.	Sex.	Previous Attack	Duration.	Symptoms.	Nose.	Eustachian Tube.	M.
1	16	Female	None	13 hours.	Fullness 13 hours; pain 8 hours.	Acute purulent, much swelling.	Much swollen, very red; adenoids in fossa.	Left, d
2	9	Male	None	24 hours.	Severe pain; first darting, steady for 8 hours.	Septum to left; right turbinate hypertrophied.	Angry, swollen mucous membrane; central adenoids.	Right; brand
3	7	Male	Several	12 hours.	Severe pain all night; intense at present.	Normal.	Posterior turbinates hypertrophied; tubes much inflamed.	Right; nelli's bulgi
4	37	Male	When child	48 hours.	Fullness 36 hours; pain 12 hours, very severe 8 hours.	Spur right; acute inflammation.	Pus in nasopharynx; both tubes inflamed.	Left; flame
5	24	Female	None	6 hours.	Pressure 2 hours, followed by intense pain.	Excessive thin secretion (4 days' cold).	Injected, bands in fossae.	Right; bulgi
6	56	Female	None	R. 40 hours. L. 3 hours.	Right, pain; left, tinnitus.	Deflection left; spur left; right turbinate hypertrophied.	Much inflamed and swollen.	Right; retra
7	41	Female	When child	30 hours.	Fullness 24 hours; pain 6 hours, intense 2 hours.	Inflammation.	Very much swollen and injected.	Left; 1
8	14	Male	None	4 hours.	Right, jumping pain.	Normal.	Depressed and swollen; some adenoids.	Right; bulgi
9	27	Male	5 years ago	40 hours.	Grippe for week; pain in left for 1½ days, very deaf.	Much inflammation and secretion; ridge, right.	Very much inflamed.	Yellowish p
10	School nurse	Female	Several attacks	11 hours.	Left, pain and roaring for whole night.	Acute purulent inflammation.	Both congested; left, much swollen.	Left; b
11	8	Female	2 or 3	2 hours.	Snapping first; steady pain 3 hours.	General hypertrophy.	Adenoids; tubes puffy; considerable secretion in epipharynx.	Right; very
12	11	Male	None	48 hours.	Pain, at first intermittent, steady for 5 hours.	General hypertrophy, secretion.	Both swollen; adenoids in left fossa.	Right;
13	26	Female	Number years ago	30 hours.	Intermittent pain 24 hours; severe posterior 6 hours.	Rhinitis, secretion.	Intensely injected and swollen.	Right; ed bu
14	6	Male	None	1 week.	Deaf for week; attacks of pain for 3 days, steady for 3 hours.	Deflection left; hypertrophy right turbinate; general rhinitis.	Purulent secretion.	Right, bulgi
15	19	Male	Several	72 hours.	Fullness and roaring 24 hours; pain 3 hours.	Deflection left; hypertrophy right turbinate; general inflammation.	Puffy; some adenoids; hypertrophied posterior turbinates.	Left; b
16	34	Female	None	1 week.	Intermittent pain for week, severe 12 hours.	Left antrum pus; douched.	Pus in epipharynx; tubes much swollen and bathed in pus.	Right;
17	5	Male	1 year ago	7 hours.	Awoke with severe pain in left ear.	Acute inflammation.	Injected; hypersecretion.	Red, bu
18	43	Female	None	12 hours.	Snapping and fullness; intermittent pain.	Perforation septum, considerable secretion.	Band in left fossa; both tubes inflamed.	Left; bulgi
19	11	Female	Several	14 hours.	Some pain all night, severe this morning, left.	Sneezing for five days, acute inflammation.	Much swelling; adenoids.	Left; th
20	8	Male	None	5 hours.	Several days cold; pain this morning in right ear now severe.	Acute secretion.	Considerable inflammation.	Right; tense
21	44	Female	Childhood	6 days.	Nearly week fullness; 14 hours pain; 6 hours severe pain.	Polyps right; general hypertrophy.	Thick, boggy, dark red.	Reddish ing.
22	25	Male	None	40 hours.	Severe cold several days; right ear pain for 1½ days.	Acute secretion; rhinitis; deflection to right.	Secretion, adenoids in fossa, inflamed mucous membrane.	Right; mark
23	28	Male	One	9 hours.	Left, 9 hours severe pain.	Discharge for week; general, acute rhinitis.	Very much swollen tubes.	Red, bu
24	17	Female	Many attacks	15 hours.	Pain, increasing all day; severe now.	Approximately normal.	Inflamed, very large adenoids.	Cicatric ent.
25	14	Female	None	6 hours.	Six hours, severe pain in right ear.	Atrophy.	Atrophic epipharynx and tubes.	Bulging
26	32	Male	Childhood	12 hours.	Left ear full and paining; growing worse.	Acute inflammation; ridge, left.	Considerable secretion.	Grayish

	Membrana Tympani.	TREATMENT		
		First.	Second.	Third.
ade-	Left, dark red, bulging.	Pain relieved, discharge in tube.	No pain, membrane red and some bulging, fullness.	Much relieved, membrane much less congested, tube less swollen.
mem-	Right; red, bulging membrane.	Pain stopped, bulging relieved.	Slight dull pain, moderate bulging, relieved.	Occasional darting pain, no bulging.
per-	Right; gray, bulging, Schrapnell's membrane red and bulging.	Tension relieved, pain less.	Pain gradually subsided, slept well.	No pain; cicatrix posterior inferior quadrant.
both	Left; marked bulging, inflamed canal.	Pain stopped.	Roaring and snapping; attacks of pain.	Pus from tube, some roaring, no pain.
	Right; injected, moderately bulging.	Pain relieved, no change in appearance of membrane.	No symptoms, membrane slightly inflamed.	Sunday.
llen.	Right; dark red, bulging; left; retracted.	Pain relieved, tinnitus not relieved.	Marked tinnitus in the right ear; left well.	Sunday.
in-	Left; intensely red; bulging.	Tube open; pus seen in tube; pain relieved.	No pain, intense fullness.	Sunday.
ome	Right; moderately injected, bulging; left, cicatricized.	Pain relieved.	Slight pain last night, some bulging.	No pain, fullness and deafness.
	Yellowish red, bulging; swollen posterior canal.	Pain relieved, hearing not relieved.	Sunday.	Pressure, slight bulging, very deaf.
uch	Left; bulging and red.	Pain relieved, some roaring remained.	Sunday.	Heavy feeling, roaring, membrane red, no bulging.
con-	Right; red, bulging; canal very red.	Pain partially relieved; serous discharge from tubes.	Twinges of pain much relieved after treatment.	Ear snaps and rings, appearance improved.
left	Right; very red and bulging.	Sharp pain relieved, bulging relieved.	Pain slight, tinnitus severe, considerable deafness.	No pain, slight tinnitus, less deaf.
vol-	Right; grayish yellow, marked bulging.	Could not relieve symptoms; paracentesis.	Very thick pus; could not open tube.	Profuse discharge, much pain.
	Right, retracted; left, red and bulging.	Pain relieved, still some bulging.	Severe attack of pain, some mastoid tenderness.	No pain, less mastoid tenderness.
per-	Left; bulging.	Roaring and pain relieved, fullness not relieved.	Attacks of roaring, fullness.	High pitched tinnitus, no bulging.
bes	Right; very thick, bulging.	Severe pain relieved, dull pain remained.	Less pain, still some bulging.	No pain, roaring, red, but not bulging membrane.
	Red, bulging.	Apparent relief.	No more pain.	Membrane well.
bes	Left; intense inflammation, bulging.	Seen through tube; pain relieved.	No pain, throbbing, some hissing.	Hissing, tinnitus, full feeling.
	Left; thick, injected, bulging.	Pain relieved.	Pain during night, some bulging, relieved.	No pain.
	Right; marked bulging; intense red.	Pain stopped.	Ear whistles, only slight bulging.	Sunday.
	Reddish gray, moderate bulging.	Pain relieved, pressure relieved.	No pain, pressure disagreeable.	Pressure relieved.
ssa,	Right; intense inflammation marked bulging.	Pain and bulging relieved.	Pain returned this morning, again relieved.	Slight twinges of pain.
ane.	Red, bulging.	Entirely relieved of pain.	Fullness, no pain.	Much better.
ids.	Cicatricized, reddish, adherent.	Tube opened, symptoms relieved.	Much relief since treatment.	Slight twinges of pain.
and	Bulging, red membrane.	Pain relieved.	Sunday.	Membrane red, no pain.
	Grayish red, bulging.	Bulging relieved.	Pain less, some bulging, much relief to-day.	No pain since last treatment.

Nose.	Eustachian Tube.	Membrana Tympani.	First.	Second.	
Acute purulent, much swelling.	Much swollen, very red; adenoids in fossa.	Left, dark red, bulging.	Pain relieved, discharge in tube.	No pain, membrane red and some bulging, fullness.	Much mucus.
Septum to left; right turbinate hypertrophied.	Angry, swollen mucous membrane; central adenoids.	Right; red, bulging membrane.	Pain stopped, bulging relieved.	Slight dull pain, moderate bulging, relieved.	Occasional br.
Normal.	Posterior turbinates hypertrophied; tubes much inflamed.	Right; gray, bulging, Schrapnell's membrane red and bulging.	Tension relieved, pain less.	Pain gradually subsided, slept well.	No inflammation.
Spur right; acute inflammation.	Pus in nasopharynx; both tubes inflamed.	Left; marked bulging, inflamed canal.	Pain stopped.	Roaring and snapping; attacks of pain.	Pus no longer.
Excessive thin secretion (4 days' cold).	Injected, bands in fossae.	Right; injected, moderately bulging.	Pain relieved, no change in appearance of membrane.	No symptoms, membrane slightly inflamed.	Sunday.
Deflection left; spur left; right turbinate hypertrophied.	Much inflamed and swollen.	Right; dark red, bulging; left; retracted.	Pain relieved, tinnitus not relieved.	Marked tinnitus in the right ear; left well.	Sunday.
Inflammation.	Very much swollen and injected.	Left; intensely red; bulging.	Tube open; pus seen in tube; pain relieved.	No pain, intense fullness.	Sunday.
Normal.	Depressed and swollen; some adenoids.	Right; moderately injected, bulging; left, cicatrized.	Pain relieved.	Slight pain last night, some bulging.	No pain, no secretion.
Much inflammation and secretion; ridge, right.	Very much inflamed.	Yellowish red, bulging; swollen posterior canal.	Pain relieved, hearing not relieved.	Sunday.	Pressure decreased.
Acute purulent inflammation.	Both congested; left, much swollen.	Left; bulging and red.	Pain relieved, some roaring remained.	Sunday.	Heavy br.
General hypertrophy.	Adenoids; tubes puffy; considerable secretion in epipharynx.	Right; red, bulging; canal very red.	Pain partially relieved; serous discharge from tubes.	Twinges of pain much relieved after treatment.	Ear and nose.
General hypertrophy, secretion.	Both swollen; adenoids in left fossa.	Right; very red and bulging.	Sharp pain relieved, bulging relieved.	Pain slight, tinnitus severe, considerable deafness.	No pain, no deafness.
Rhinitis, secretion.	Intensely injected and swollen.	Right; grayish yellow, marked bulging.	Could not relieve symptoms; paracentesis.	Very thick pus; could not open tube.	Profuse secretion.
Deflection left; hypertrophy right turbinate; general rhinitis.	Purulent secretion.	Right, retracted; left, red and bulging.	Pain relieved, still some bulging.	Severe attack of pain, some mastoid tenderness.	No pain, no secretion.
Deflection left; hypertrophy right turbinate; general inflammation.	Puffy; some adenoids; hypertrophied posterior turbinates.	Left; bulging.	Roaring and pain relieved, fullness not relieved.	Attacks of roaring, fullness.	High bulging.
Left antrum pus; douched.	Pus in epipharynx; tubes much swollen and bathed in pus.	Right; very thick, bulging.	Severe pain relieved, dull pain remained.	Less pain, still some bulging.	No pain, no bulging.
Acute inflammation.	Injected; hypersecretion.	Red, bulging.	Apparent relief.	No more pain.	Membrane.
Perforation septum, considerable secretion.	Band in left fossa; both tubes inflamed.	Left; intense inflammation, bulging.	Seen through tube; pain relieved.	No pain, throbbing, some hissing.	Hissing, infl.
Coughing for five days, acute inflammation.	Much swelling; adenoids.	Left; thick, injected, bulging.	Pain relieved.	Pain during night, some bulging, relieved.	No pain, no secretion.
Acute secretion.	Considerable inflammation.	Right; marked bulging; intense red.	Pain stopped.	Ear whistles, only slight bulging.	Sunday.
Spurs right; general hypertrophy.	Thick, boggy, dark red.	Reddish gray, moderate bulging.	Pain relieved, pressure relieved.	No pain, pressure disagreeable.	Pressure.
Acute secretion; rhinitis; deflection to right.	Secretion, adenoids in fossa, inflamed mucous membrane.	Right; intense inflammation marked bulging.	Pain and bulging relieved.	Pain returned this morning, again relieved.	Slight.
Discharge for week; general, acute rhinitis.	Very much swollen tubes.	Red, bulging.	Entirely relieved of pain.	Fullness, no pain.	Much.
Approximately normal.	Inflamed, very large adenoids.	Cicatrized, reddish, adherent.	Tube opened, symptoms relieved.	Much relief since treatment.	Slight.
Hypertrophy.	Atrophic epipharynx and tubes.	Bulging, red membrane.	Pain relieved.	Sunday.	Membrane.
Acute inflammation; ridge.	Considerable secretion.	Grayish red, bulging.		Pain less, some bulging, much	

TREATMENTS.

	Third.	Fourth.	Fifth.	Later.
d and	Much relieved, membrane much less congested, tube less swollen.	No ear symptoms, except slight dullness of hearing, membrane pink.	Ear well.	Twentieth day; removed adenoids from fossae.
derate	Occasional darting pain, no bulging.	Slight fullness, tinnitus.	Tinnitus only symptoms.	Eighth day; ear well. Advised removal of adenoids.
slept	No pain; cicatrix posterior inferior quadrant.			
; at	Pus from tube, some roaring, no pain.	Sunday.	Much fullness, no bulging, tinnitus.	Seventh day; no symptoms, membrane slightly pinkish color.
brane	Sunday.	Ear well, severed bands in fossae.		
right	Sunday.	Slight pain, left tinnitus.	No pain, tinnitus relieved.	Eighth day; no symptoms; still some inflammation of epipharynx and tubes
s.	Sunday.	Did not return, no symptoms.	Pain last night; broke and discharged rupture posterior quadrant.	Thick pus for three weeks.
some	No pain, fullness and deafness.	Some better.	Much better.	Tenth day; no symptoms for three days; hearing normal.
	Pressure, slight bulging, very deaf.	Much improved, hearing better.	Improved.	Seventh day; well except deafness; ninth day; hearing 3/5; fourteenth day; hearing nearly normal.
	Heavy feeling, roaring, membrane red, no bulging.	Much better; symptoms improved.	Much improved; membrane retracted.	Eighth day; slight intermittent tinnitus; eleventh day; less tinnitus; 15th day; no symptoms.
h re-	Ear snaps and rings, appearance improved.	Much better.		Sixth day; ear well. Advised adenoid operation.
evere.	No pain, slight tinnitus, less deaf.	No symptoms, slight deafness.		Twelfth day; slight deafness, removed adenoids from fossae.
d not	Profuse discharge, much pain.	No change.	Under treatment.	Recovered after five weeks, considerable loss of hearing (said she was some deaf before).
some	No pain, less mastoid tenderness.	Sunday.	No symptoms.	Eleventh day; no symptoms since last note; discharged well.
illness.	High pitched tinnitus, no bulging.	Sunday.	Calcareous deposit posterior quadrant.	Seventh day; no symptoms; advised operation on nose.
lging	No pain, roaring, red, but not bulging membrane.	Sunday.	Roaring; less pus in antrum.	Treated 3 weeks before cured; still some antral pus.
	Membrane well.			
hiss-	Hissing, tinnitus, full feeling.	Sunday.	Much relieved, membrane moderately injected.	Eighth day; membrane well; some tinnitus; twelfth day; no symptoms for three days.
some	No pain.	Sunday.	No symptoms, membrane still inflamed somewhat.	Seventh day; improved; twelfth day well; membrane shows scar from previous attack.
slight	Sunday.	Some noise, acute pain.	Dull roaring, no bulging, slight injection.	Seventh day; well.
agree-	Pressure relieved.	Absent.	Steady improvement.	Ninth day; discharged well.
rning.	Slight twinges of pain.	Roaring, fullness	Sunday.	Sixth day; much relief; tenth day, some deafness; sixteenth day, well.
	Much better.	Sunday.	Severe pain, marked bulging; could not avoid paracentesis.	Tender mastoid; discharge 2 days.
ment.	Slight twinges of pain.	Sunday.	No symptoms, no inflammation.	
	Membrane red, no pain.	Well.		General sinusitis.
much			Membrane red, deafness, no pain.	Twelfth day; improvement every day; apparently cured.

3	7	Male	Several	12 hours.	Severe pain in left ear at present.			
4	37	Male	When child	48 hours.	Fullness 36 hours; pain 48 hours, very severe 8 hours.	tion.	tubes inflamed.	flamed ear
5	24	Female	None	6 hours.	Pressure 2 hours, followed by intense pain.	Excessive thin secretion (4 days' cold).	Injected, bands in fossae.	Right; injected, bulging.
6	56	Female	None	R. 40 hours. L. 3 hours.	Right, pain; left, thinitis.	Deflection left; spur left; right turbinate hypertrophied.	Much inflamed and swollen.	Right; dark retracted.
7	41	Female	When child	30 hours.	Fullness 24 hours; pain 6 hours, intense 2 hours.	Inflammation.	Very much swollen and injected.	Left; intense.
8	14	Male	None	4 hours.	Right, jumping pain.	Normal.	Depressed and swollen; some adenoids.	Right; moderate bulging; left
9	27	Male	5 years ago	40 hours.	Grippe for week; pain in left for 1½ days, very deaf.	Much inflammation and secretion; ridge, right.	Very much inflamed.	Yellowish retracted posterior
10	School nurse	Female	Several attacks	11 hours.	Left, pain and roaring for whole night.	Acute purulent inflammation.	Both congested; left, much swollen.	Left; bulging.
11	8	Female	2 or 3	2 hours.	Snapping first; steady pain 3 hours.	General hypertrophy.	Adenoids; tubes puffy; considerable secretion in epipharynx.	Right; red, very red.
12	11	Male	None	48 hours.	Pain, at first intermittent, steady for 5 hours.	General hypertrophy, secretion.	Both swollen; adenoids in left fossa.	Right; very
13	26	Female	Number years ago	30 hours.	Intermittent pain 24 hours; severe posterior 6 hours.	Rhinitis, secretion.	Intensely injected and swollen.	Right; grayish ed bulging.
14	6	Female	None	1 week.	Deaf for week; attacks of pain for 3 days, steady for 3 hours.	Deflection left; hypertrophy right turbinate; general rhinitis.	Purulent secretion.	Right, retracted bulging.
15	19	Female	Several	72 hours.	Fullness and roaring 24 hours; pain 3 hours.	Deflection left; hypertrophy right turbinate; general inflammation.	Puffy; some adenoids; hypertrophied posterior turbinates.	Left; bulging.
16	34	Female	None	1 week.	Intermittent pain for week, severe 12 hours.	Left antrum pus; douched.	Pus in epipharynx; tubes much swollen and bathed in pus.	Right; very
17	5	Male	1 year ago	7 hours.	Awoke with severe pain in left ear.	Acute inflammation.	Injected; hypersecretion.	Red, bulging.
18	43	Female	None	12 hours.	Snapping and fullness; intermittent pain.	Perforation septum, considerable secretion.	Band in left fossa; both tubes inflamed.	Left; intense, bulging.
19	11	Female	Several	14 hours.	Some pain all night, severe this morning, left.	Sneezing for five days, acute inflammation.	Much swelling; adenoids.	Left; thick,
20	8	Male	None	5 hours.	Several days cold; pain this morning in right ear now severe.	Acute secretion.	Considerable inflammation.	Right; marked tense red.
21	44	Female	Childhood	6 days.	Nearly week fullness; 14 hours pain; 6 hours severe pain.	Polyps right; general hypertrophy.	Thick, boggy, dark red.	Reddish grayish.
22	25	Male	None	40 hours.	Severe cold several days; right ear pain for 1½ days.	Acute secretion; rhinitis; deflection to right.	Secretion, adenoids in fossa, inflamed mucous membrane.	Right; intense, marked bulging.
23	28	Male	One	9 hours.	Left, 9 hours severe pain.	Discharge for week; general, acute rhinitis.	Very much swollen tubes.	Red, bulging.
24	17	Female	Many attacks	15 hours.	Pain, increasing all day; severe now.	Approximately normal.	Inflamed, very large adenoids.	Cicatricized, ent.
25	14	Female	None	6 hours.	Six hours, severe pain in right ear.	Atrophy.	Atrophic epipharynx and tubes.	Bulging, red.
26	32	Male	Childhood	12 hours.	Left ear full and pain; growing worse.	Acute inflammation; ridge, left.	Considerable secretion.	Grayish red.
27	20	Female	None	20 hours.	14 hours left ear plugged; 5 hours, pain growing worse.	No signs.	Much inflammation.	Very dark red.
28	16	Male	None	8 hours.	Awoke in night with severe pain in right ear.	Badly deflected septum; hypertrophy; secretion.	General congestion.	Red, moderate.
29	48	Male	Childhood	24 hours.	Two days, fullness; 8 hours, pain; cold, 1 week.	Acute rhinitis.	Whole epipharynx inflamed.	Thick, bulging.
30	12	Male	Several	11 hours.	11 hours pain in left ear.		Adenoids in lateral fossae; general inflammation.	Red, bulging.
31	23	Female	None	3 days.	Intermittent pain for 3 days in left ear, cold 2 weeks.	Severe, purulent rhinitis.	Much pus in nasopharynx; tube much swollen.	Marked bulging.

Flamed canal.	Pain stopped.	During the sleeping, attacks of pain.	Pus from tube, some roaring, no pain.
Right; injected, moderately bulging.	Pain relieved, no change in appearance of membrane.	No symptoms, membrane slightly inflamed.	Sunday.
Right; dark red, bulging; left; retracted.	Pain relieved, tinnitus not relieved.	Marked tinnitus in the right ear; left well.	Sunday.
Left; intensely red; bulging.	Tube open; pus seen in tube; pain relieved.	No pain, intense fullness.	Sunday.
Right; moderately injected, bulging; left, cicatrized.	Pain relieved.	Slight pain last night, some bulging.	No pain, fullness and deafness.
Yellowish red, bulging; swollen posterior canal.	Pain relieved, hearing not relieved.	Sunday.	Pressure, slight bulging, very deaf.
Left; bulging and red.	Pain relieved, some roaring remained.	Sunday.	Heavy feeling, roaring, membrane red, no bulging.
Right; red, bulging; canal very red.	Pain partially relieved; serous discharge from tubes.	Twinges of pain much relieved after treatment.	Ear snaps and rings, appearance improved.
Right; very red and bulging.	Sharp pain relieved, bulging relieved.	Pain slight, tinnitus severe, considerable deafness.	No pain, slight tinnitus, less deaf.
Right; grayish yellow, marked bulging.	Could not relieve symptoms; paracentesis.	Very thick pus; could not open tube.	Profuse discharge, much pain.
Right, retracted; left, red and bulging.	Pain relieved, still some bulging.	Severe attack of pain, some mastoid tenderness.	No pain, less mastoid tenderness.
Left; bulging.	Roaring and pain relieved, fullness not relieved.	Attacks of roaring, fullness.	High pitched tinnitus, no bulging.
Right; very thick, bulging.	Severe pain relieved, dull pain remained.	Less pain, still some bulging.	No pain, roaring, red, but not bulging membrane.
Red, bulging.	Apparent relief.	No more pain.	Membrane well.
Right; intense inflammation, bulging.	Seen through tube; pain relieved.	No pain, throbbing, some hissing.	Hissing, tinnitus, full feeling.
Left; thick, injected, bulging.	Pain relieved.	Pain during night, some bulging, relieved.	No pain.
Right; marked bulging; intense red.	Pain stopped.	Ear whistles, only slight bulging.	Sunday.
Reddish gray, moderate bulging.	Pain relieved, pressure relieved.	No pain, pressure disagreeable.	Pressure relieved.
Right; intense inflammation marked bulging.	Pain and bulging relieved.	Pain returned this morning, again relieved.	Slight twinges of pain.
Red, bulging.	Entirely relieved of pain.	Fullness, no pain.	Much better.
Cicatrized, reddish, adherent.	Tube opened, symptoms relieved.	Much relief since treatment.	Slight twinges of pain.
Bulging, red membrane.	Pain relieved.	Sunday.	Membrane red, no pain.
Grayish red, bulging.	Bulging relieved.	Pain less, some bulging, much relief to-day.	No pain since last treatment.
Very dark red and bulging.	Much relief.	Still darting pains.	Gradually improving.
Red, moderately bulging.	Some relief.	Considerable pain, entirely relieved.	Only slight pain since last treatment.
Thick, bulging membrane.	Pain stopped; fullness relieved.	Fullness, some tinnitus.	Sunday.
Red, bulging membrane.	Pain relieved.	Sunday.	Only slight pain, slight bulging, relieved.
Marked bulging.	Bulging relieved.	Slight pain since treatment.	Absent.

2	7	Male	Several	12 hours.	at present.			
4	37	Male	When child	48 hours.	Fullness 36 hours; hours, very severe 4 hours.	tion.	adeno-inflamed.	marked ear
5	24	Female	None	6 hours.	Pressure 2 hours, followed by intense pain.	Excessive thin secretion (4 days' cold).	Injected, bands in fossae.	Right; injected, bulging.
6	56	Female	None	R. 40 hours. L. 3 hours.	Right, pain; left, tinnitus.	Deflection left; spur left; right turbinate hypertrophied.	Much inflamed and swollen.	Right; dark retracted.
7	41	Female	When child	30 hours.	Fullness 24 hours; pain 6 hours, intense 2 hours.	Inflammation.	Very much swollen and injected.	Left; intense.
8	14	Male	None	4 hours.	Right, jumping pain.	Normal.	Depressed and swollen; some adenoids.	Right; moderate bulging; left
9	27	Male	5 years ago	40 hours.	Grippe for week; pain in left for 1½ days, very deaf.	Much inflammation and secretion; ridge, right.	Very much inflamed.	Yellowish retraction posterior
10	School nurse	Female	Several attacks	11 hours.	Left, pain and roaring for whole night.	Acute purulent inflammation.	Both congested; left, much swollen.	Left; bulging.
11	8	Female	2 or 3	2 hours.	Snapping first; steady pain 3 hours.	General hypertrophy.	Adenoids; tubes puffy; considerable secretion in epipharynx.	Right; red, very red.
12	11	Male	None	48 hours.	Pain, at first intermittent, steady for 5 hours.	General hypertrophy, secretion.	Both swollen; adenoids in left fossa.	Right; very
13	26	Female	Number years ago	30 hours.	Intermittent pain 24 hours; severe posterior 6 hours.	Rhinitis, secretion.	Intensely injected and swollen.	Right; grayish ed bulging
14	6	Male	None	1 week.	Deaf for week; attacks of pain for 3 days, steady for 3 hours.	Deflection left; hypertrophy right turbinate; general rhinitis.	Purulent secretion.	Right, retracted bulging.
15	19	Male	Several	72 hours.	Fullness and roaring 24 hours; pain 3 hours.	Deflection left; hypertrophy right turbinate; general inflammation.	Puffy; some adenoids; hypertrophied posterior turbinates.	Left; bulging.
16	34	Female	None	1 week.	Intermittent pain for week, severe 12 hours.	Left antrum pus; douched.	Pus in epipharynx; tubes much swollen and bathed in pus.	Right; very
17	5	Male	1 year ago	7 hours.	Awoke with severe pain in left ear.	Acute inflammation.	Injected; hypersecretion.	Red, bulging
18	43	Female	None	12 hours.	Snapping and fullness; intermittent pain.	Perforation septum, considerable secretion.	Band in left fossa; both tubes inflamed.	Left; intense, bulging.
19	11	Female	Several	14 hours.	Some pain all night, severe this morning, left.	Sneezing for five days, acute inflammation.	Much swelling; adenoids.	Left; thick, inflamed
20	8	Male	None	5 hours.	Several days cold; pain this morning in right ear now severe.	Acute secretion.	Considerable inflammation.	Right; marked tense red.
21	44	Female	Childhood	6 days.	Nearly week fullness; 14 hours pain; 6 hours severe pain.	Polyps right; general hypertrophy.	Thick, boggy, dark red.	Reddish grayish ing.
22	25	Male	None	40 hours.	Severe cold several days; right ear pain for 1½ days.	Acute secretion; rhinitis; deflection to right.	Secretion, adenoids in fossa, inflamed mucous membrane.	Right; intense, marked bulging
23	28	Male	One	9 hours.	Left, 9 hours severe pain.	Discharge for week; general, acute rhinitis.	Very much swollen tubes.	Red, bulging.
24	17	Female	Many attacks	15 hours.	Pain, increasing all day; severe now.	Approximately normal.	Inflamed, very large adenoids.	Cicatrized, ent.
25	14	Female	None	6 hours.	Six hours, severe pain in right ear.	Atrophy.	Atrophic epipharynx and tubes.	Bulging, red
26	32	Male	Childhood	12 hours.	Left ear full and pain; growing worse.	Acute inflammation; ridge, left.	Considerable secretion.	Grayish red.
27	20	Female	None	20 hours.	14 hours left ear plugged; 5 hours, pain growing worse.	No signs.	Much inflammation.	Very dark red
28	16	Male	None	8 hours.	Awoke in night with severe pain in right ear.	Badly deflected septum; hypertrophy; secretion.	General congestion.	Red, moderate
29	48	Male	Childhood	24 hours.	Two days, fullness; 8 hours, pain; cold, 1 week.	Acute rhinitis.	Whole epipharynx inflamed.	Thick, bulging
30	12	Male	Several	11 hours.	11 hours pain in left ear.		Adenoids in lateral fossae; general inflammation.	Red, bulging
31	23	Female	None	3 days.	Intermittent pain for 3 days in left ear, cold 2 weeks.	Severe, purulent rhinitis.	Much pus in nasopharynx; tube much swollen.	Marked bulging

named canal.	Pain stopped.	lack of pain.	No pain.	
Right; injected, moderately bulging.	Pain relieved, no change in appearance of membrane.	No symptoms, membrane slightly inflamed.	Sunday.	Ear
Right; dark red, bulging; left; retracted.	Pain relieved, tinnitus not relieved.	Marked tinnitus in the right ear; left well.	Sunday.	Shi
Left; intensely red; bulging.	Tube open; pus seen in tube; pain relieved.	No pain, intense fullness.	Sunday.	Did
Right; moderately injected, bulging; left, cicatrized.	Pain relieved.	Slight pain last night, some bulging.	No pain, fullness and deafness.	Son
Yellowish red, bulging; swollen posterior canal.	Pain relieved, hearing not relieved.	Sunday.	Pressure, slight bulging, very deaf.	Mu
Left; bulging and red.	Pain relieved, some roaring remained.	Sunday.	Heavy feeling, roaring, membrane red, no bulging.	Mu
Right; red, bulging; canal very red.	Pain partially relieved; serous discharge from tubes.	Twinges of pain much relieved after treatment.	Ear snaps and rings, appearance improved.	Mu
Right; very red and bulging.	Sharp pain relieved, bulging relieved.	Pain slight, tinnitus severe, considerable deafness.	No pain, slight tinnitus, less deaf.	No
Right; grayish yellow, marked bulging.	Could not relieve symptoms; paracentesis.	Very thick pus; could not open tube.	Profuse discharge, much pain.	No
Right, retracted; left, red and bulging.	Pain relieved, still some bulging.	Severe attack of pain, some mastoid tenderness.	No pain, less mastoid tenderness.	Su
Left; bulging.	Roaring and pain relieved, fullness not relieved.	Attacks of roaring, fullness.	High pitched tinnitus, no bulging.	Su
Right; very thick, bulging.	Severe pain relieved, dull pain remained.	Less pain, still some bulging.	No pain, roaring, red, but not bulging membrane.	Su
Left, bulging.	Apparent relief.	No more pain.	Membrane well.	
Left; intense inflammation, bulging.	Seen through tube; pain relieved.	No pain, throbbing, some hissing.	Hissing, tinnitus, full feeling.	Su
Left; thick, injected, bulging.	Pain relieved.	Pain during night, some bulging, relieved.	No pain.	Su
Right; marked bulging; intense red.	Pain stopped.	Ear whistles, only slight bulging.	Sunday.	Su
Reddish gray, moderate bulging.	Pain relieved, pressure relieved.	No pain, pressure disagreeable.	Pressure relieved.	A
Right; intense inflammation marked bulging.	Pain and bulging relieved.	Pain returned this morning, again relieved.	Slight twinges of pain.	I
Left, bulging.	Entirely relieved of pain.	Fullness, no pain.	Much better.	Su
Cicatrized, reddish, adherent.	Tube opened, symptoms relieved.	Much relief since treatment.	Slight twinges of pain.	Su
Bulging, red membrane.	Pain relieved.	Sunday.	Membrane red, no pain.	
Grayish red, bulging.	Bulging relieved.	Pain less, some bulging, much relief to-day.	No pain since last treatment.	
Very dark red and bulging.	Much relief.	Still darting pains.	Gradually improving.	
Left, moderately bulging.	Some relief.	Considerable pain, entirely relieved.	Only slight pain since last treatment.	
Thick, bulging membrane.	Pain stopped; fullness relieved.	Fullness, some tinnitus.	Sunday.	
Left, bulging membrane.	Pain relieved.	Sunday.	Only slight pain, slight bulging, relieved.	
Marked bulging.	Bulging relieved.	Slight pain since treatment.	Absent.	

Pain all night; intense secret.	Normal.	Posterior turbinates hypertrophied; tubes much inflamed.	Right; grayish yellow, bulging.			
56 hours; pain 12 very severe 8 hours.	Spur right; acute inflammation.	Pus in nasopharynx; both tubes inflamed.	Left; marked inflammation.	Pain stopped.	attacks of pain.	
2 hours, followed by pain.	Excessive thin secretion (4 days' cold).	Injected, bands in fossae.	Right; injected, moderately bulging.	Pain relieved, no change in appearance of membrane.	No symptoms, membrane slightly inflamed.	Sund
Int; left, tinnitus.	Deflection left; spur left; right turbinate hypertrophied.	Much inflamed and swollen.	Right; dark red, bulging; left; retracted.	Pain relieved, tinnitus not re- lieved.	Marked tinnitus in the right ear; left well.	Sund
24 hours; pain 6 intense 2 hours.	Inflammation.	Very much swollen and in- jected.	Left; intensely red; bulging.	Tube open; pus seen in tube; pain relieved.	No pain, intense fullness.	Sund
umping pain.	Normal.	Depressed and swollen; some adenoids.	Right; moderately injected, bulging; left, cicatrized.	Pain relieved.	Slight pain last night, some bulging.	No
er week; pain in left days, very deaf.	Much inflammation and secre- tion; ridge, right.	Very much inflamed.	Yellowish red, bulging; swol- len posterior canal.	Pain relieved, hearing not re- lieved.	Sunday.	Pres
and roaring for night.	Acute purulent inflammation.	Both congested; left, much swollen.	Left; bulging and red.	Pain relieved, some roaring remained.	Sunday.	Heavy
first; steady pain 3	General hypertrophy.	Adenoids; tubes puffy; con- siderable secretion in epi- pharynx.	Right; red, bulging; canal very red.	Pain partially relieved; se- rious discharge from tubes.	Twinges of pain much re- lieved after treatment.	Ear
first intermittent, for 5 hours.	General hypertrophy, secre- tion.	Both swollen; adenoids in left fossa.	Right; very red and bulging.	Sharp pain relieved, bulging relieved.	Pain slight, tinnitus severe, considerable deafness.	No
ent pain 24 hours; posterior 6 hours.	Rhinitis, secretion.	Intensely injected and swol- len.	Right; grayish yellow, mark- ed bulging.	Could not relieve symptoms; paracentesis.	Very thick pus; could not open tube.	Prof
week; attacks of 3 days, steady for	Deflection left; hypertrophy right turbinate; general rhinitis.	Purulent secretion.	Right, retracted; left, red and bulging.	Pain relieved, still some bulg- ing.	Severe attack of pain, some mastoid tenderness.	No
and roaring 24 pain 3 hours.	Deflection left; hypertrophy right turbinate; general inflammation.	Puffy; some adenoids; hyper- trophied posterior turbi- nates.	Left; bulging.	Roaring and pain relieved, fullness not relieved.	Attacks of roaring, fullness.	High
ent pain for week, 12 hours.	Left antrum pus; douched.	Pus in epipharynx; tubes much swollen and bathed in pus.	Right; very thick, bulging.	Severe pain relieved, dull pain remained.	Less pain, still some bulging	No p
with severe pain in	Acute inflammation.	Injected; hypersecretion.	Red, bulging.	Apparent relief.	No more pain.	Mem
and fullness; inter- pain.	Perforation septum, consider- able secretion.	Band in left fossa; both tubes inflamed.	Left; intense inflammation, bulging.	Seen through tube; pain re- lieved.	No pain, throbbing, some hiss- ing.	Hiss
n all night, severe orning, left.	Sneezing for five days, acute inflammation.	Much swelling; adenoids.	Left; thick, injected, bulging.	Pain relieved.	Pain during night, some bulging, relieved.	No p
ays cold; pain this in right ear now	Acute secretion.	Considerable inflammation.	Right; marked bulging; in- tense red.	Pain stopped.	Ear whistles, only slight bulging.	Sund
week fullness; 14 ain; 6 hours severe	Polyps right; general hyper- trophy.	Thick, boggy, dark red.	Reddish gray, moderate bulg- ing.	Pain relieved, pressure re- lieved.	No pain, pressure disagree- able.	Pres
old several days; r pain for 1½ days.	Acute secretion; rhinitis; de- flection to right.	Secretion, adenoids in fossa, inflamed mucous membrane.	Right; intense inflammation marked bulging.	Pain and bulging relieved.	Pain returned this morning, again relieved	Slight
urs severe pain.	Discharge for week; general acute rhinitis.	Very much swollen tubes.	Red, bulging.	Entirely relieved of pain.	Fullness, no pain.	Much
creasing all day; se- w.	Approximately normal.	Inflamed, very large adenoids.	Cicatrized, reddish, adher- ent.	Tube opened, symptoms re- lieved.	Much relief since treatment.	Slight
severe pain in right	Atrophy.	Atrophic epipharynx and tubes.	Bulging, red membrane.	Pain relieved.	Sunday.	Mem
full and paining; worse.	Acute inflammation; ridge, left.	Considerable secretion.	Grayish red, bulging.	Bulging relieved.	Pain less, some bulging, much relief to-day.	No p
left ear plugged; 5 ain growing worse.	No signs.	Much inflammation.	Very dark red and bulging.	Much relief.	Still darting pains.	Grad
night with severe light ear.	Badly deflected septum; hy- pertrophy; secretion.	General congestion.	Red, moderately bulging.	Some relief.	Considerable pain, entirely relieved.	Only
fullness; 8 hours, d, 1 week.	Acute rhinitis.	Whole epipharynx inflamed.	Thick, bulging membrane.	Pain stopped; fullness re- lieved.	Fullness, some tinnitus.	Sund
ain in left ear.		Adenoids in lateral fossae; general inflammation.	Red, bulging membrane.	Pain relieved.	Sunday.	Only
at pain for 3 days ar, cold 2 weeks.	Severe, purulent rhinitis.	Much pus in nasopharynx; tube much swollen.	Marked bulging.	Bulging relieved.	Slight pain since treatment.	Abse

	no pain.			color.
membrane	Sunday.	Ear well, severed bands in fossae.		
right	Sunday.	Slight pain, left tinnitus.	No pain, tinnitus relieved.	Eighth day; no symptoms; still some inflammation of epipharynx and tubes
ss.	Sunday.	Did not return, no symptoms.	Pain last night; broke and discharged rupture posterior quadrant.	Thick pus for three weeks.
some	No pain, fullness and deafness.	Some better.	Much better.	Tenth day; no symptoms for three days; hearing normal.
	Pressure, slight bulging, very deaf.	Much improved, hearing better.	Improved.	Seventh day; well except deafness; ninth day; hearing 3/5; fourteenth day; hearing nearly normal.
	Heavy feeling, roaring, membrane red, no bulging.	Much better; symptoms improved.	Much improved; membrane retracted.	Eighth day; slight intermittent tinnitus; eleventh day; less tinnitus; 15th day; no symptoms.
ch re-	Ear snaps and rings, appearance improved.	Much better.		Sixth day; ear well. Advised adenoid operation.
severe.	No pain, slight tinnitus, less deaf.	No symptoms, slight deafness.		Twelfth day; slight deafness, removed adenoids from fossae.
d not	Profuse discharge, much pain.	No change.	Under treatment.	Recovered after five weeks, considerable loss of hearing (said she was some deaf before).
some	No pain, less mastoid tenderness.	Sunday.	No symptoms.	Eleventh day; no symptoms since last note; discharged well.
illness.	High pitched tinnitus, no bulging.	Sunday.	Calcareous deposit posterior quadrant.	Seventh day; no symptoms; advised operation on nose.
bulging	No pain, roaring, red, but not bulging membrane.	Sunday.	Roaring; less pus in antrum.	Treated 3 weeks before cured; still some antral pus.
	Membrane well.			
hiss-	Hissing, tinnitus, full feeling.	Sunday.	Much relieved, membrane moderately injected.	Eighth day; membrane well; some tinnitus; twelfth day; no symptoms for three days.
some	No pain.	Sunday.	No symptoms, membrane still inflamed somewhat.	Seventh day; improved; twelfth day well; membrane shows scar from previous attack.
slight	Sunday.	Some noise, acute pain.	Dull roaring, no bulging, slight injection.	Seventh day; well.
agree-	Pressure relieved.	Absent.	Steady improvement.	Ninth day; discharged well.
orning.	Slight twinges of pain.	Roaring, fullness	Sunday.	Sixth day; much relief; tenth day, some deafness; sixteenth day, well.
	Much better.	Sunday.	Severe pain, marked bulging, could not avoid paracetamol.	Tender mastoid; discharge 2 days.
ment.	Slight twinges of pain.	Sunday.	No symptoms, no inflammation.	
	Membrane red, no pain.	Well.		General sinusitis.
, much	No pain since last treatment.	Absent.	Membrane red, deafness, no pain.	Twelfth day; improvement every day; apparently normal to-day.
	Gradually improving.	Tinnitus, high pitched.	Tinnitus.	Tinnitus severe, although all symptoms of inflammation were improved; ceased at the end of 18 days.
ntirely	Only slight pain since last treatment.	Much improved.	Sunday.	Sixth day; no symptoms; ninth day; well.
	Sunday.	Tinnitus, no pain since last treatment.	No signs; tinnitus less.	Seventh day; improved; eleventh day; no symptoms.
	Only slight pain, slight bulging, relieved.	Much relieved.	No symptoms.	Twelfth day; removed adenoids; left membrane everted.
ment.	Absent.	Slight pain, signs much improved.		Thirteenth day; not seen since fourth treatment; well.

ment to the healing of the membrane varied from 5 days to 7 weeks. Two of the mastoids demanded operation. Four cases were not cured.

Of the chronic cases there have been 20 with a discharge of pus, 14 in which there was granulation tissue present, 13 with necrosis, 11 where symptoms and signs demonstrated a mastoid complication. Three of the mastoid cases also showed necrosis in the middle ear, and in four granulations were present in the middle ear.

In 11 of the chronic cases both ears were suppurative. This made 69 chronic suppurative middle ears observed. In all of these suppurative cases the usual middle ear treatment was used as well as the treatment by the eustachian tube. In 24 of these cases adenoid tissue was removed from the lateral fossæ and in a number this adenoid tissue extended over the cushion of the tube.

Five of the mastoid cases were later operated upon. Four apparently subsided as the membranæ tympanorum healed and no inflammatory signs remained.

Two continued to discharge after six weeks' treatment and refused to be operated upon. Seven of the necrosis cases were cured. Six continued to discharge.

Nine of the granulating ears were relieved and six resisted treatment.

Of the 31 simple chronic suppurations, 14 were healed. Eight were relieved, and nine were not apparently relieved.

Of the chronic catarrhal cases, 166 presented thickened membranes, 27 showed a thin atrophied membrane, 42 a retracted but otherwise an apparently normal membrane, and 51 showed cicatricial tissue and should perhaps be classed with the suppurative group, as they are the result of suppurative process. In this series, among those classed as thickened membrane, there were 63 in whom both membranes were thickened and one thin membrane. Five with one membrane simply retracted, 12 with signs of old suppurative process in one ear.

Of the symptoms associated with the chronic catarrhal ears, tinnitus was the most frequently relieved. The hearing was also much more frequently improved than by other methods of treatment. There were 2 cases of severe vertigo in this group, and they were entirely cured.

In closing I wish to emphasize the importance of being able to examine the epipharynx easily and thoroughly and to treat any pathologic conditions by the aid of vision.

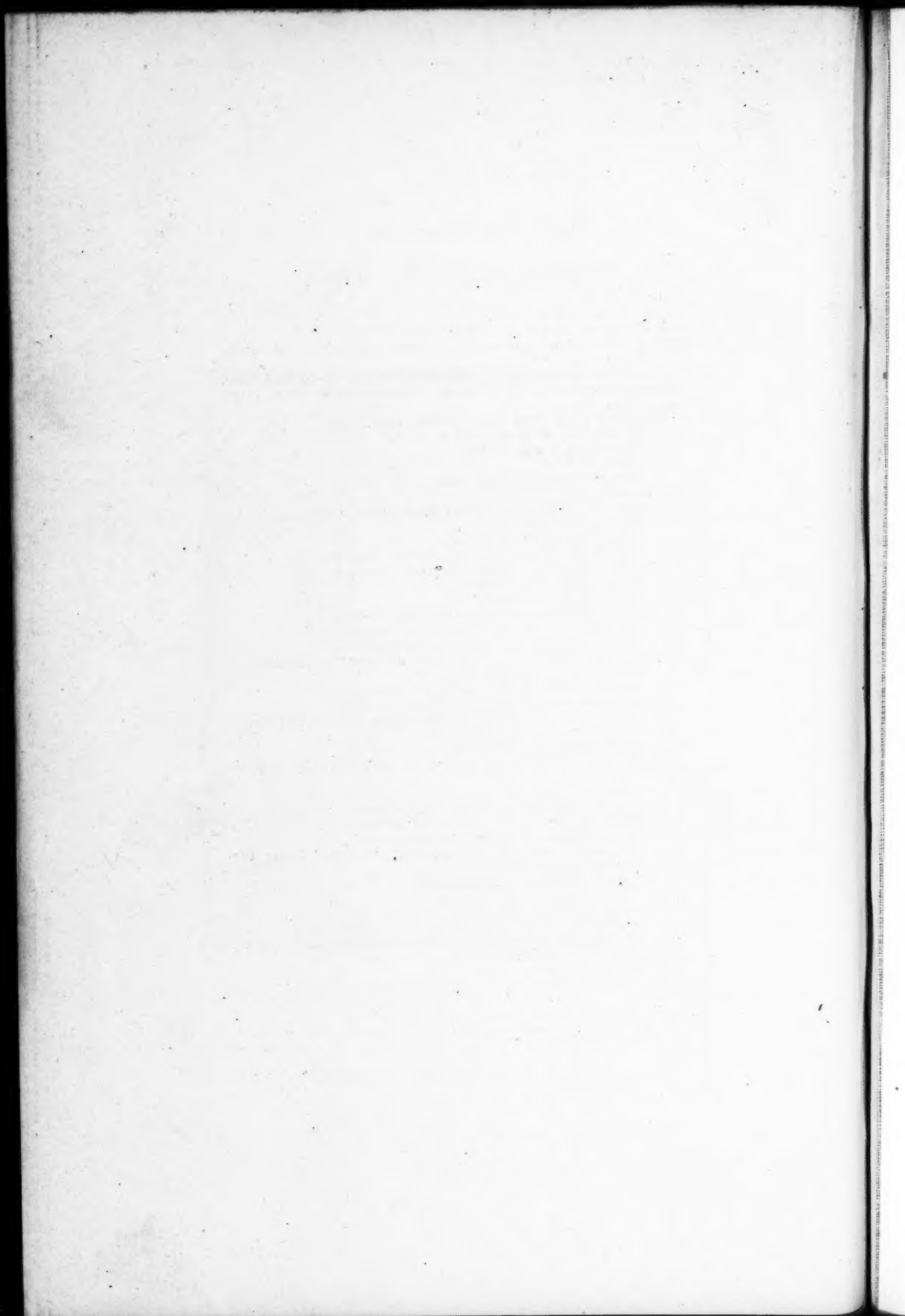
I wish also to impress the necessity for careful and extensive study of the pathology of this region, the association of aural disease with this pathology, and the results of treatment both upon the local condition and upon the resulting aural diseases.

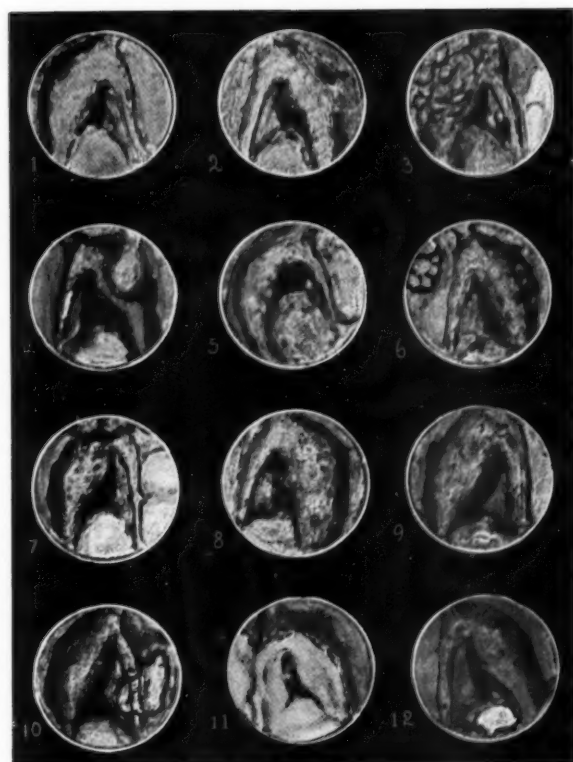
Having attempted more than I ought in the time given and having to limit the length of this paper, I have been obliged to generalize to quite an extent and to omit much which I would like to have and which should be presented.

This work has convinced me that we shall accomplish much in the future which we have been unable to do in the past.

DESCRIPTION OF COLORED PLATES.

1. Normal tube.
2. Bands across lateral fossa.
3. Adenoid tissue extending over cushion of tube.
4. Hard fibrous polyp attached to posterior wall of lateral fossa.
5. Swelling of floor of tube.
6. Angiomatous appearance of middle turbinate. Deformed tube.
7. Adenoid pressing on top of tube. Hypertrophied lower turbinate on anterior lip.
8. Hypertrophy of mucous membrane of tube.
9. Anterior swelling of membrane of tube.
10. Syphilitic ulcer of anterior lip.
11. Diphtheria of tube.
12. Syphilitic ulceration floor of tube.
13. Myxoma in tube.
14. Ligamentous band from anterior lip of tube to nasal septum.
15. Pus discharging from tube.
16. Large turbinate pressing on tube.
17. Deformed tube. Upper end of cushion wanting.
18. Deformed tube. Large posterior turbinate.
19. Adenoid in vault of epipharynx.
20. Stenosis of orifice of the tube.
21. Epipharyngeal polyp covering eustachian tube.
22. Deformed orifice. Nearly stenosed at isthmus.
23. Considerable atrophy of mucous membrane.
24. Marked hypertrophy of posterior end of lower turbinate.
25. Angiomatous lower turbinate.
26. Papillomatous growth on cushion of tube.
27. Adenoid tissue covering upper portion of tube.
28. Epipharyngeal abscess covering the upper portion of tube.
29. Adhesions across lateral fossa.
30. Adenoid growth in lateral fossa.
31. Marked deformity of tube associated with chronic suppuration of ear.
32. Very prominent tube.
33. Firm fibrous growth on cushion and in fossa.
34. Acute inflammation of tube. Double anterior lip.
35. Acute inflammation of tube. Lumen closed.
36. Walls of lateral fossa in contact. Hypertrophied lower turbinate pressing on anterior lip.
37. Pus dropping from sphenoid opening.
38. Sphenoid openings.
39. Epipharyngeal polyp.
40. Hypertrophied posterior end of middle turbinate.
41. Ethmoid cells after removal of middle turbinate.
42. Small polyps in middle fossa.
43. Large polyp in middle fossa.
44. Polyps in posterior ethmoid cells after removal of middle turbinate.
45. Floor of antrum of Highmore, tooth projecting.
46. Lateral wall of epipharynx in a case of peritonsillar abscess.
47. Opening through outer wall of lower fossa into antrum of Highmore.
48. Sharp spur at about junction of middle and posterior third of septum.

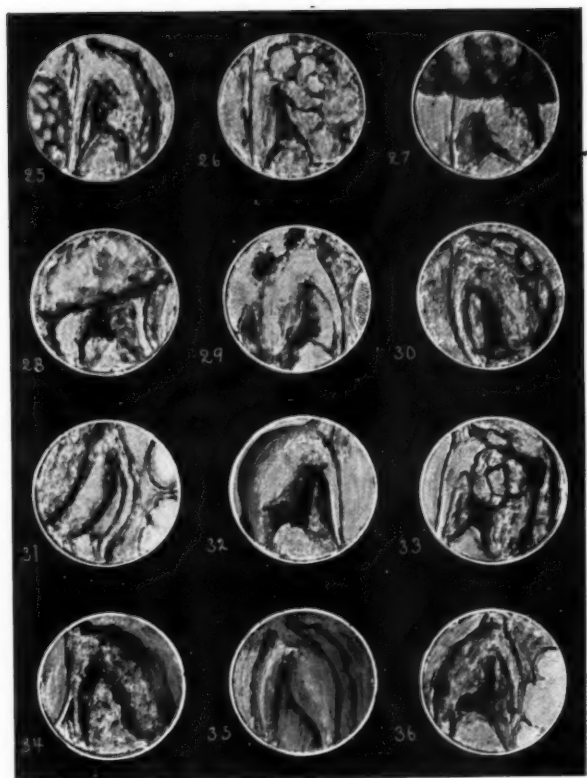




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XXXVIII.

THE ACTUAL CAUTERY IN THE TREATMENT OF
LOCALIZED TUBERCULOUS LESIONS.

By GEORGE B. WOOD, M. D.,

PHILADELPHIA.

For some time I have felt that the actual cautery, and preferably the platinum wire heated by electricity, is by far the most effective method of combating tuberculosis of the upper respiratory tract. The striking results which have followed its use in cases of pharyngeal tuberculosis have confirmed my belief in its efficiency. If a pharyngeal lesion is not too extensive and can be reached by the heat, I am of the opinion that if treated with the cautery it will in all cases heal promptly, at least such has been my experience.

The good results following the use of the cautery are equally great in the larynx, provided the lesion is so placed as to make it accessible to the action of the heat. The beneficial action of the cautery seems to reach distinctly beyond the area of destruction, and the resulting scar does not appear to be easily reinvaded.

Last fall I removed with the cautery snare for diagnostic purposes, a suspicious looking tonsil from an arrested case of pulmonary tuberculosis. The portion of the tonsil removed showed extensive typical tonsillar tuberculosis, consisting of minute young tubercles scattered throughout its extent. Five days later I removed the rest of the tonsil. The result of this last piece of tonsil was most interesting and led me to make a small series of experiments on guinea pigs. The scar in the portion of tonsil removed was surprisingly large and apparently already made up of well developed fibrous tissue, and only after the examination of a considerable number of sections did I finally discover a single small miliary tubercle, and this seemed to be already undergoing fibroid change.

EXPERIMENTS ON GUINEA PIGS.

The object of these experiments was to determine the histologic appearance of a cautery wound made through a tuberculous lesion. The series is somewhat short, but demonstrates certain peculiarities in the healing of the wound which are important in relation to the cure of a localized tuberculous lesion. It was desired to produce a superficial localized tuberculous lesion. For this purpose an attenuated culture of human tubercle bacilli which had been grown through five generations on artificial media was used. The culture from which the bacilli were taken was three weeks old.

On February 15th one c.c. of an emulsion of the above culture was injected just beneath and into the skin of the abdomen of three guinea pigs. Each pig was inoculated on each side of the abdomen so as to make two distinct and separate lesions.

On March 7th pig No. 1 showed marked induration of the inoculated areas, and on the left side there was some sloughing in the center of the lesion. About three-fourths of the lesion was cut out on the left side, and about half the lesion on the right side was destroyed with the electric cautery. The piece of skin removed from the left side was hardened in Zenker's solution imbedded in paraffin and sections stained with hematoxylin and eosin. These sections showed a large central lesion of epitheloid cells with slight necrosis in the center; surrounding this were a few isolated discrete tubercles composed of epitheloid cells. There was very little tendency to the formation of giant cells and there were numerous polymorphonuclear cells scattered throughout the central lesions and massing on the surface.

On March 13th the animal was killed, the lesions removed and hardened in Zenker's solution. Sections were stained with hematoxylin and eosin and also with Mallory's connective tissue stain. Macroscopically the lesion which had been cut showed advance and the skin was apparently adherent to the abdominal muscles, but there were no tubercles on the neighboring peritoneum. The burnt lesion macroscopically appeared to be healing and was not adherent to the underlying muscle tissue.

Under the microscope the cut lesion showed the ordinary

histologic appearance of tuberculosis without the formation of giant cells. There was considerable necrosis, some extension into the surrounding muscle tissue and some new fibrous tissue. There were a few new-formed blood vessels, but no marked inflammatory reaction.

The burned lesions showed considerable tuberculous tissue, but around the margin where the slough following the cauterization had come away there was a marked inflammatory reaction. There were numerous new blood vessels, most of them were filled with blood, and the formation of new fibrous tissue was very marked. Outside of this zone of reaction the tuberculous tissue appeared apparently unaltered, and there were some tubercles in the surrounding muscle.

Pig No. 2. March 28th cauterized both abdominal lesions.

March 31st. Pig killed. The skin lesions were removed and hardened in Zenker's solution. Sections were stained in hematoxylin and eosin. The inguinal lymph glands were enlarged and caseous. On both abdominal lesions the eschar was still adherent and there seemed to be a slight shrinking in size of the tuberculous area since they had been burned.

Microscopically the lesion showed a considerable area of tuberculosis, unaltered except in a zone surrounding the base of the eschar. Here the inflammatory reaction was fairly well marked and the new blood vessels, while not so numerous as in the burned lesion of pig No. 1, formed a distinct zone, many of them being filled with blood. There was some tuberculous infiltration of the surrounding muscle tissue.

Pig No. 3. March 26th cauterized both abdominal lesions and punctured an enlarged right inguinal lymph gland with cautery point. The node was completely caseous, a large quantity of the material escaping when the platinum point went through the capsule.

April 17th. Pig killed. The lesions in the abdominal wall and the left inguinal lymph gland were removed and placed in Zenker's solution. Sections were stained with hematoxylin and eosin and Mallory's connective tissue stain. Macroscopically the lesion on the left side of the abdomen showed a healthy, shallow, raw surface without induration, and probably was caused by breaking a partially healed wound by rough handling. The wound in the right side of the abdomen was so nearly healed that it was difficult to find until the hair had been re-

moved. There was a slight induration along the scar, and at one end there was a small crust, which showed the wound had not completely healed. There was a beginning general miliary tuberculosis.

Histologically the left wound appeared as a shallow ulcer with a small amount of necrosis on the surface and numerous polymorphonuclear leucocytes. There was some tuberculous tissue in the immediate neighborhood, as evidenced by the presence of epitheloid cells. The right wound showed a healed surface with a rather large deposit of fibrous tissue, but underneath this a small area of epitheloid cells. The inguinal lymph gland showed a small, healed punctate scar, but it was so completely caseous that the histologic study did not show anything of interest.

SUMMARY.

In three days after the cauterization of a low grade tuberculous lesion there developed a distinct zone of inflammatory reaction around the area of destruction. This reaction was manifest by the presence of newly formed blood vessels, congestion and fibroblasts. Beyond this zone of reaction the tuberculous process seemed unaltered. In six days the zone of reaction was much more marked, the blood vessels being more numerous and larger, and there was a distinct deposit of fibrous tissue between the epitheloid cells of the tuberculous mass. The tuberculous process beyond the zone of reaction was apparently unaltered except that it seemed for some reason less in extent. In twenty days the lesions were to the naked eye almost healed. A fibrous cicatrix had formed in the zone of the inflammatory reaction, and though there was some tuberculous tissue still present beneath the scar, the amount was very small and becoming gradually cicatrized.

These few experiments seem to have substantiated certain clinical observations as regard to the use of the cautery in treating localized tuberculosis. There is no doubt that a retarding influence is exerted beyond the area actually destroyed by the heat. We know that a tuberculous nodule heals by cicatrization, and therefore anything that aids in the formation of fibrous tissue aids in the cure of the disease. Further, by the induction of acute inflammation with the subsequent formation of new blood vessels, nutrition is brought

to a part which would otherwise break down into a necrotic mass because of a lack of sufficient food to nourish the tissues. Again, the eschar produced by the burning prevents reinoculation until the tissue has become sufficiently resistant to protect itself. Also the cauterization seals the lymphatics and blood vessels, thereby preventing a spread of the disease either locally through the lymph system or generally through the blood vessels.

XXXIX.

THE MORE EFFICIENT METHODS OF AURAL
MASSAGE.

BY ALEX. RANDALL, M. D.,

PHILADELPHIA.

The theme chosen could hardly be less novel, not only because Simeon in the 11th Century headed a long list of writers on the subject, but because late years have seen so many articles and inventions in the matter that now the appliances actuated by mouth-, hand-, hydraulic-, or electric-power are almost as numerous as the users or even as the patients submitted to them. It is because of the bewildering wealth of material and the diversity of views expressed, that I shall essay to winnow out some of those points which have best met the needs of my experience. Others have doubtless as much right to enunciate conclusions differing from mine; but I believe that those who have not yet crystalized an experience of their own, will find my suggestions helpful.

Amidst the variety of apparatus, there is some risk that the principles may be lost sight of and the practice consist mainly in turning upon the patient some especially commended masseur. So it will be well to recall that the ideal form of massage is that by the voice, even though few will undertake to use it rightly. Yet there are cases credibly reported in which an adult reared as a deaf-mute has had his vestiges of hearing so developed by a devoted wife's persistent use of her voice that it has become possible for him to hear and understand an unseen speaker in another room. But this is an electric age; and that man is regarded as quite fossilized who undertakes to use the voice for any such purpose except through the medium of some up-to-date microphone. Twenty years ago a competitor for the Lanval prize fairly proved that the microphone has no practical value for the deaf and its inventor

is said to prefer a big tin trumpet. But thousands are spent annually in advertising the wonders wrought by such instruments, doubtless with a profit of tens of thousands to the advertisers.

It is too generally ignored that the benefit of the telephone, of whatever form, is in "transposing" the pitch of the conversational voice out of its ill-heard register into a higher key where the listener's hearing is little, if at all impaired.

The magnification of the sound is usually a drawback, being of the sounds least desired; and it can be distinctly detrimental. The usually attenuated sounds transmitted by the telephone can be exhausting to the ear, if only because of the attention required to hear them amid any irrelevant sounds and because of the jarring noises sometimes intercurrent. The massage value of such tones is minimal, since their pitch is often such as to allow them to pass directly through the drumhead to cause molecular vibrations at the fenestra, with little or no vibrations of the chain of ossicles.

Most of what has been accomplished with massage-apparatus we owe to Siegle (*Deutsche Klinik*, 1864), whose pneumatic otoscope remains one of the best appliances at our command. A bulb excels his earlier method of giving the pressure and suction, although we are generally wise to use no more force than can be obtained by the mouth, i. e., probably about 5 pounds of positive and negative pressure. Under its use the response of the tympanic tissues can be in great measure seen, both as to their mobility and their injection, under such stimulation. The criticism has been advanced that all congestion is harmful and tends to further sclerotic changes. On the contrary, we have no other means so capable of obtaining absorption of pathologic exudates. Whoever has studied in the eye the absorption wrought by dionin, or the clearing of corneal opacities under massage with ung. hydrargyri oxidi flav., can readily refute such a mistaken claim. That the massage can be abused only proves its potency, unless it can be shown that it cannot be employed without excessive action. Examination of the ear shortly after such congestive response demonstrates that injection has soon disappeared; and the main value which I claim for my method of spraying dionin per catheter is that its congestion of the tympanic mucosa serves to promote absorption of

the pseudo-anchylosis bands or thickenings. The pneumatic speculum should not be too deeply introduced, should not press too much on the veins of the front wall, damming up the tympanic effluent (although some of this is advantageous, as in Politzer's plugging of the canal in the hope of causing absorption of the air outside as well as within the drumhead); but too marked a "passive hyperemia" might cause extravasations. A bit of rubber tubing should usually be placed on the tip of the speculum to insure gentle air-tight closure of the meatus without bruising; the bulbous tip of the Delstanche and other instruments is rarely so good.

Some writers have so little grasped the principles of the use of the masseur as to deny that any appliance except some modification of their own permits of suction. Any form of the instrument, simple or complex, can be made to give positive or negative pressure, or both. Individual preference will modify the instrument in various details—for myself I much prefer the magnifying form as making quickly clear many details of the fundus which might escape even prolonged study of the unenlarged tissues. The pertinent fact is that valuable massage of the drumhead and ossicular chain can be thus accomplished. We are usually dealing with a depressed drumhead and wish to restore it to its normal tension and position. Suction rather than pressure is to be used; but all of our efforts to "suck outward" the drum membrane avail nothing unless there is air in the tympanic cavity. Our lessened pressure without permits the expansion of what air is within the tympanum to force the drumhead outward. Failure to secure visible motion may not signify adhesions or rigidity—only an absence of air back of the tympanic membrane. Hence, inflation by the Politzer method, or better as a rule by the catheter, may be prerequisite to any mobilizing of the drumhead and the ossicular chain by pneumatic massage.

A perforation of the tympanic membrane may preclude any difference of pressure change on its inside and outside, and our pneumatic massage then fails to elicit any visible motion. This does not prove that no motion is secured; on the contrary, any fluid in the tympanum may be seen to move. The varying pressure upon the stapes and round window membrane may excite marked motion with nystagmus, vertigo and even syncope. The most striking examples of the "fistula symptom"

are often cases with no history or sign of suppuration, but presumably with a very relaxed stapedo-fenestral articulation. Light massage may bowl them from their seats more easily than violent syringing would do it for other patients. So the absence or immobility of the drumhead and ossicles does not mean that we can accomplish nothing useful by our massage. As before intimated, the mere cupping effect may by its congestion increase the plasticity of the parts with ulterior, if not immediate, advantage.

Since the effect of the pneumatic massage upon the broader surface of the drumhead may be far more potent upon the important factors of the conducting apparatus than that exercised through a perforation, it is well to remember that the open drum membrane may be closed and perhaps instantly mobilized by the application of Blake's paper patch; and it is often for this special purpose that I employ this device. Conversely, it is often the pneumatic speculum which enables us best to adjust such patches and test the snugness of their application to the margins of the perforation, which we wish to excite to reparative activity. I am a firm believer in the usual necessity of a mobile drum membrane for the hearing of tones of low pitch; and as the rapidity of the vibrations of even our most rapid pneumatic masseurs is often far below that of the lowest audible tones, there is full need to avail ourselves of this rehabilitation of the impaired conducting apparatus.

The matter of the direct manual massage of the conducting structures of the middle ear is too little dealt with by most authors. We know of Lucae's spring probe, though so little that one of Politzer's translators called it "Lucae's feathering-sound" and many were none the wiser or less so. Those who have seen or read of the device have generally been repelled and have made little or no use of it or its substitutes. Lucae himself gave up most of his mechanical additions and later preferred it in its simplest form; and this can well be further simplified by leaving off the spring. Any light probe, cotton tipped, can serve the purpose—preferably the Harrison Allen cotton carrier. It is often notoriously painful as Lucae advised it: its tip was sometimes frozen to secure a benumbing of the short process or other parts touched. This is quite needless if we will cover its cotton tip with a salve—preferably

of sticky lanolin: then we can get both traction and pressure on the parts acted on, but so cushioned by the yielding buffer of salve that no spring is desired; and the light hand can impart to the precise region needing it a rapid and painless direct motion. And this often has its best uses after the destruction of the drumhead and larger ossicles, for we can work directly with the stapes and round window membranes, stretching adhesions and effectually mobilizing conditions of pseudo-anchylrosis. I have published cases of signal gain from this measure, as when in a lady of 30, whose useless right ear had been pronounced past all aid by some of our best men, the hearing was raised to hearing a forced whisper at five meters, and continued her sole dependence for the rest of her busy, useful life.

No small part of the efficacy of this direct massage lies in its inunction of medicaments capable of aiding the restoration and maintenance of mobility; so the tip of salve upon the probe can be adapted to the requirements of the case. The yellow oxide of mercury has been my chief reliance, stimulant and absorbent in action; but ichthyol or its preferable alternate thigenol, has been much used in cases calling for more sedative effect. Not rarely in the chronic catarrhs, especially in more advanced life, I have been gratified by the good effect of phosphorus oil, 1 per cent, commended as a help in "presbykosis" by Sapolini. It may be wiped over the drumhead and walls and then gently rubbed in by the massage as applied by the cotton tipped probe to the short process, posterior fold and other regions. No "sweet oil" will surely remain sweet in the warm auditory canal, and so this application has in a few instances irritated sharply; or it may have been incompatible with some other medicament simultaneously used.

Many regard all hand-power appliances as obsolete and use and advocate those actuated by hydraulic, pneumatic or electric motors as the only up-to-date instruments. Some employ the massage for five, ten or even twenty minutes at a sitting—a practice which cannot be commended—and must save themselves this tedious manipulation. Some regard the speed of vibration required for the best results to be beyond that obtainable by the hand. It is difficult with the Siegle actuated by hand-power to get ten actions per second, while the other devices may much surpass this speed; and it is argued that the

lowest tones audible are above 16 if not 32 per second. Still it is true that good results can be secured by the slower motions, with perhaps greater safety than by the more rapid; and I believe that muscle-sense and brain are better controllers of the massage than any mechanical device.

On the other hand, to offset the value claimed for such automatic appliances as the electric masseurs must be placed the danger of rhythmic massage. We have long known that the bridge is in peril on which too many persons or cattle are moving in step; and the molecular changes which deteriorate metals and other dead materials still more endanger living tissues. A persistently vibrating tuning fork among guinea-pigs quickly induces cataract in their eyes (v. Stein). The dentist has had largely to abandon the use of the electric hammer, which beautifully compacted the gold of his fillings but killed the nerves beneath. Similar vibrations will doubtless degenerate the cochlear nerve with its ganglion cells and terminal organ, although the experiments of Wittmaack and others are not conclusive. We often find catarrhally deaf patients with more nerve involvement than could be expected from the age, the duration or the other elements of the case; and the question, "Have you been using an electric vibrator?" is usually affirmatively answered, sometimes with the declaration that there has been evident loss since its use. It is easy to collect many parallels in the occupational deafness of the boilermaker and other workmen. The vibraphone and similar devices put forth a decade or more ago were advocated especially by the homeopaths, perhaps because the harm done by the telephone gave, by the "law of similars," promise of benefit to the deaf. Those who employed them found that they did indeed stir up the torpid ears; but that they soon exhausted dangerously the nerve power. They silenced tinnitus (in cases where they did not cause it); but often they so reduced perception that all objective as well as subjective noises were lost. These banjo-like machines have sunk into silence, to be replaced by similar "buzzers," one of which (as I was assured by its medical advocate) has cured a deaf Queen and received at her hands a medal of honor. The tuning forks have been tried in this matter, especially in Paris, but, as one of our colleagues has reported, with results not yet satisfactory.

Most of such appliances, like the perpetual motion machine;

lack the "adjustment of one cog" to complete the perfect apparatus. Some measure of vibratory pneumomassage as well as phonomassage has been claimed for many of these inventions; but careful testing failed to substantiate any such action in those which I studied.

Hand power cannot, try as we may, be dangerously rhythmic; and for any length of "seance" which has seemed to be reasonable, has not been overtaxed in giving this pneumomassage; while the eye behind the Siegle speculum can measure the effect in motion and congestion, and so may control the force and rapidity of the vibrations propagated through the conducting apparatus. The dosage may thus be determined with much accuracy; and the attention can be devoted to the ear under treatment instead of to the management of a complicated piece of mechanism.

Yet the evil influences that make for the impairment of the hearing are almost ceaseless in their activity, while the surgeon's measures of relief are occasional and often too much interrupted. A massage that can be put in the hands of the patient may be of great value, if it be not dangerous. Such a measure was given us in the "Tragus-presse" of Hommel; but I believe that I much improved upon it in the "massage by the finger-tip," which I have long advocated (*Philadelphia Polyclinic*, September 28, 1895). It can well be employed by the surgeon, the patient or any other, with no need for apparatus; and some twenty years of its use has never showed me any harm from its free employment. It should be dosed in accordance with the response of the ear to the pneumatic speculum and limited to such duration, force and frequency as has thus been seen to be expedient. Like all simple measures, it is easily improved upon by beginners who have not yet learned it; but I have not yet found a better form than that which I first advised. The pulp of the (middle) finger, generally of both hands simultaneously, is introduced into the meatus, drawing the tragus forward by slight rotation and pressed as deep as the dropped jaw will permit. Then gentle pumping movements in and out furnish a massage which is mainly by suction and can be safely continued from thirty to sixty seconds at varying rates of rapidity. It can be as slow as sixty per minute or less, or quickened until as a mere tremor it is more than ten per second; while the degree of excursion can regulate the force

as fully as in the most perfect mechanical masseur. This can well be alternated with similar pumping by the flat of the palm, stretched tight as it is laid in contact with the auricle and arched by slight flexion of the hand. This latter measure is so inconspicuous that the patient, as though smoothing the hair, can apply it unnoticed in the most public place and lift a burden of deafness and tinnitus just at the moment when such help is most desired. It makes also the readiest means of relief in vertigo and faintness occurring under treatment; supplemented, of course, in the latter case by causing the patient to bend forward so as to bring the face close to the knees. A half dozen applications of this hand-massage each day have seemed none too much, and have been most useful adjuvants to the periodic treatments by the surgeon; and they well can be continued during the intermission of other measures.

Of the more elaborate forms of massage of the eustachian tubes by the bougie, simple and vibratory, I have little here to say except that they are dangerous in even the most expert hands; but I cannot sufficiently insist upon the value of the gargle as a gymnastic and massage of the tubes and pharynx. Medicaments are often poorly applied by gargling; but we have in heat one that can reach where the hot water itself does not reach, and its constringent effect is equalled by few drugs at our command. A stroking massage of the neck between the ear and the ramus of the jaw can make itself well felt by the eustachian tube, but it is rarely used to much advantage except in expert hands; while the wonder-working manipulations of the osteopath have never within my observation been availing except in extracting fees from the credulous.

In closing this plea for the recognition of the dangers of phonomassage as well as of all pneumatic or direct massage that is regular and rhythmic, I wish to insist that there is some pro and con to every measure that has here come under discussion; and in the hands of experts who give unflagging attention to avoiding their evils, they are all capable of being used to the advantage of our patients. But there are devices of almost ridiculous simplicity that fully equal them in my opinion for all good uses. The safety and availability of the simple old Siegle speculum and the home use of hand massage, gargling (especially hot gargling) and such every day meas-

ures, precludes that they shall ever become obsolete. Let us strive, each and all, to be up-to-date in our knowledge and utilization of every good thing that can benefit our patients; but in this as in all else that is admirable, may we all be "gentlemen of the old school."

XL.

ARE THE TONSILS A MENACE OR A PROTECTION?

BY HENRY L. SWAIN, M. D.,

NEW HAVEN.

If, in answer to the above question, we were to judge of the opinion of the majority of operators in this country on the principle that "a workman is known by his chips," or to form an idea as to how necessary it is to remove the above mentioned menace by the amount written upon the subject, and the multitude of ways described, and the instruments devised in the last four years to carry out the alluring, spectacular, and gory operation called tonsillectomy, we would not only assume that everybody thought tonsils a dreadful thing to have around, but that any physician or surgeon who did not, on sight, enucleate every tonsil was not only derelict in his duty, but a renegade deserving lasting contumely.

When an author speaks of his experience in upwards of 9,000 cases, mentioning especially 3,000 removed within the capsule—the only method which he thinks is really worth while—within the last six or seven years, he certainly has a right to speak advisedly as an expert in regard, at least, to methods. Also, it will be readily deduced that he felt that in removing tonsils thus wholly he was not depriving the patient of anything important. When, as is the practice in recent years of many operators all over the country, to always enucleate the tonsils as completely as possible in all cases, either children or adults, as a routine procedure, it would certainly seem to argue that, in general, tonsils are better out than in. The question of relative size, appearance, healthiness of structure, or any such matter is apparently never thought of. Remove anyway, and dismiss the matter as not worthy of further consideration.

Take this association, the leading exponent of, and repre-

senting the most enlightened sentiment in this country, if not the whole world. Its opinion is looked up to as expressive of the broadest and deepest possible insight into the problems of the physiology and pathology of the upper air passages. In our annual meeting, in Boston, two years ago, presided over by Professor Coolidge, only one man had sufficiently the courage of his convictions to say a word apparently in contradiction to the tremendous weight of the general opinion of the men present. He said: "The question of the removal of the tonsils revolves upon the point of whether the tonsil is a necessary organ or not." "We should remember," he further stated, "that they have an internal secretion *sui generis*, both afferent and efferent lymph vessels, and although there may be diseased tissue or crypts, we could often take away enough of these deformities, and yet leave enough of the organ to perform proper functions." In keeping with this view, he thought that he knew of patients where, in view of later developments, he wished there had been left in them some of the tonsil tissue he had removed. This view was expressed by the elder Shurly, and any formal statement from him is entitled to all the serious consideration which his broad experience and great learning justify.

He was followed by Dr. Casselberry, who frankly stated that he believed just the contrary, and lived only to regret that he had not removed more rather than less. And those of you who attended the annual dinner remember how he went so far as to very drolly describe how he was supposed to have dreamed, while asleep that afternoon, that in the next world he was persecuted by the ghosts of those who had gone there because he had not removed their tonsils, or enough of them.

All those who spoke seemed to favor Dr. Casselberry's belief. Only one, Swain by name, in discussing a later paper on the following day, expressed his opinion that the tonsil was of the same importance, no more, no less, as any other lymph node. If one had incised the neck for any reason, it was not thought necessary to take out all the lymph nodes because they were visible or palpable. Only when they are thought to be diseased do we remove them. So, it seemed to him, it should be with the tonsils. If in the way because too large, why not do as we always used to do, and take away enough to fill the bill and leave the rest? If diseased, then, and then only, do a tonsil-

lectomy. Tonsillectomy as a routine procedure especially in the young would then be entirely unjustifiable under any other than diseased conditions, unless we could rule positively that the tonsil has no function.

A most intelligent and enlightened physician who, quite contrary to the usual rule among such, is the father of a large family, last year had to have the tonsils of one child removed because, during the previous winter, the child had an attack of general cervical adenitis which was slow in subsiding, causing the father to fear that the tonsils might be tuberculous. While the surgeon laryngologist was at the house, he had a younger child who had never had any trouble with his tonsils, but who might possibly have, also completely robbed of his adenoids and both faucial tonsils. This winter cervical adenitis was much in evidence, and his family was one of those attacked. The first child in the family to succumb was the younger one who was especially operated upon to avoid it. He had it the hardest, and his glands were much slower in going down than two of the other children whose tonsils, by some oversight, were still present in their interiors. The older tonsillectomized child was away from home. Certainly the tonsils in the younger were not a menace, for they were not there, but their absence might have been, and the whole clinical history thus briefly chronicled plainly points to the fact that the absorption into the cervical lymph nodes probably was not through the tonsils at all in any of the cases, but that the tonsils only enlarged just the same and for the same reasons that the other lymph nodes did.

Two students, from different cities, were treated by me for sore throats during the fall term of year before last. This last fall I treated them for the same kind of sore throats which they had had the previous year, and each had glandular enlargements in the neck. In examining their throats there was disclosed a harrowing tale. The executioner had been at work, and plainly did it show. They had each, in an unguarded moment, told their respective families that they had had, during the previous year, a severe sore throat. Each was hurried to the family specialist, and the tonsils found enlarged and a menace; they were condemned to the block, and each tonsillectomized. One had to have the pillars of the palate on both sides sewed together to stop the hemorrhage. The resulting

cicatrices had caused a considerable tightening and consequent interference with the motion of the palate. The other had lost the posterior pillar of the palate, and a rude adhesion narrowed down the opening into the nasopharynx on that side. The former came out of the hospital weighing fifteen pounds less than when he went in, was a long time in recovering his strength, and had been brought that low because his tonsils were a menace. I have treated him three times for sore throat; once before, twice since the removal, and each time the nasopharynx and the lateral columns were the part primarily involved; the tonsils, on the first occasion, only secondarily, if at all.

The same thing happened to the very erudite and exceedingly close observer who is now in the act of reading this paper to you, only being of a conservative nature, and holding pretty firm convictions as to his duty, he had simply followed, as we all do, his routine hobby. A Vassar girl came with the report that she had frequent attacks of tonsillitis; could Dr. Swain prevent them? Surely. He freed the small tonsils from the pillars, slit up the connecting crypts, removed the contents of the crypts, and shrunk the general mass by ignipuncture. Result: tonsils small, nodular, flat and discrete. Patient gained four pounds in weight during the treatment, as is often found to be the case. Her pillars were all right, and there were no deformities anywhere, and no serious hazard to life. She, too, went back to college, and promptly was sent home sick with sore throat. Dr. Swain was interrogated over the telephone as to what he thought of the matter. He replied, voicing his ignominious chagrin, but begged to have one last, long lingering look at the fair maiden's throat. It was reluctantly granted. He discovered that he, too, had been incorrectly informed, as the home doctor had in the previously reported cases, and again it was the lateral column of the pharynx which was involved. Proper operative treatment was undertaken, and the young lady has never, to my knowledge, had any further trouble, and this happened five years ago.

If further comment is necessary upon this sad picture of two very eminent men and my lesser self so readily led to butcher the tonsils each in his own way, it is to state more definitely the purpose for which this sorrowful tale was here introduced, viz.: to show how universally exists the readiness

to blame the tonsil; and furthermore, how little we know, or how little we deduce from the appearance of a tonsil as to how much of a menace it really is. None of us (for I personally know and vouch for both of the other men) would have, for a moment, put the patient through what we did, had we not supposed it was our duty. We will cheerfully admit that the evidence was wrong, but it does not change the facts. And what happened to us is frequently happening all over the world, viz., that tonsils are unnecessarily subjected to our surgery; and may this not come from an entirely erroneous conception of our problem? Certainly it would seem that we all believe that the tonsils, especially the faucial tonsils, are not of much account and are a menace, or there could be no justification for our enucleating tonsils in young children as a routine procedure when they are simply enlarged and when in years past a simple tonsillotomy has given such general satisfaction.

Furthermore, there is the undeniable fact that the good which the tonsils may do is believed to be so small, and on the other hand they seem to be the cause of so many systemic diseases, many of them of the severest type, that if one could remove a source of infection so easily the good thereby done would more than counterbalance the harm resulting from any loss of function. Or, to put it another way, it would be necessary to prove that the tonsils do have some function, some definite office to perform, before we even hazard the raising of a hand to call a halt on the indiscriminate removal of these structures from their snug resting places.

It would also help the cause along if we could prove that often, instead of removing the cause of tubercular infection and rheumatism, we really took away one of the life guards which in health, at least, prevent the trouble from going deeper. We have already hinted at a line of argument which readily showed that often at least the faucial tonsils were credited with causing systemic disease of which they are really only sometimes the cause, and frequently the enlargement may have resulted from disease in other situations, sometimes the very disease we hoped to cure by tonsillectomy.

To discuss the last point first, the question of tuberculosis and rheumatism. For both these causes it is now the custom to extensively advise the enucleation of the tonsils. The internist has added impetus to the movement by many times going

so far as to insist that in every case of rheumatism, or even in indefinitely recurring rheumatic manifestations, the tonsils should be removed, meaning by removal enucleation—always in the adult, a serious operation. This is done in some instances entirely by rule of thumb, never even inquiring or still less caring whether the tonsils were even previously sore or in any way connected with the clinical process. As a result of this general working rule some very brilliant hits are made, but apparently fully as large a number are put through the mill without an atom of good resulting in any way, for, as before stated, the tonsils may be absolutely innocent.

Now it is a most excellent condition of things, in one way, to be operating laryngologist to a busy internist who takes the entire responsibility of removal. Failures and successes are alike credited against him, but it is a case of blissful inexactness which I consider deplorable. It would seem to me that any well equipped laryngologist could, with a little care and thought and watching, easily tell whether a given tonsil was causing trouble or not. Granted that the patient is thus referred to him for opinion, he would, in positive cases, always operate. In doubtful cases, especially when there is a good fee in sight, he could likewise be counted on to do his operation duty. But in a goodly number he would assure the patient and the consultant that the gentle attentions of the knife and guillotine might be dispensed with. He would often readily discover that the source of the rheumatic infection was somewhere else in his department and the therapy could be placed on an exact basis. This would seem surely ever so much to be desired when we think of the seriousness of the operation of tonsillectomy as it sometimes turns out.

After all, is it not the viewpoint of the beginner and the uninformed that we would seek to make more conclusive and clear? This audience does not need instructing; still less from me. But true to our motto, while making a clear picture for others, teaching, we may discover a different, broader view for ourselves. It is perhaps this in the background of my mind which makes me feel that this harangue is at all worth while. If any one of the gentlemen making up this noble body of men known as the American Laryngological Association felt that it was wise to enucleate any given pair of tonsils, there is no doubt as to the results. It would be neatly and safely done.

But it is the impression that we give, or that we have recently given, perhaps, that all tonsils are to be enucleated if operated upon at all, and that no other way exists of meeting the indication, which is having a very bad effect upon the young, ardent, and ignorant operator. Tonsillotomy, the good old-fashioned slicing off of the projecting tonsil, was the first and most frequently done operation by the beginner in the days just gone by. The young operator of to-day, following the inherited instincts of his profession, feels likewise perfectly competent to do an enucleation as one of the first things that he attempts, and I do not think it is safe. Much mischief has been done, and looking upon it in the mouths of young men from all over the country, I am sometimes appalled. I often see the work of you gentlemen, the best in the country, and to judge by some other postoperative results, I must see some of the worst work in the country. Presumably, in the case of most students who come to Yale, the best talent obtainable in any given locality would be the one which the intelligent and well-to-do families represented would naturally have employed. If to men who are especially qualified, such accidents happen as occasionally do and as I myself have seen, what must be the result when inexperienced and unskilled men take the lives of their patients in hand as they seek to imitate what they think we by our example have taught them? This carelessness or thoughtlessness on our part, if such really is the case, must surely arise from a certain bit of indifference on our part, perhaps due to a faulty conception of the conditions.

Until very recent years we have always been brought up to believe that the tonsils have no lymphatic vessels leading into them. It was a long time before it was at all conceded that they really are what they are, an important part of the lymphatic system. Even after the serious admission of that point it was still believed that, whereas lymphatic vessels led from the tonsils into the deeper lying structures in the neck connected with other lymph nodes and by virtue of well established channels communicated directly with the deeper lying nodes as far down as into the interior of the chest, to say nothing of the connection through the thoracic duct with the circulation of the blood proper, still, we failed to think of anything entering the tonsils other than through their surface. Astonishingly different views are now being brought to our

attention, and if we are at all alert to our duty, we must at least give them serious and proper consideration. If we do this, I feel confident that there will be a gradual change of view to a proper level. The pendulum has swung so far toward radicalism that it must soon revert to a more conservative position which will be nearer the line of truth.

For years we have clinically known what has been called especially to our attention by many observers in written publications, and rather prominently by Fraenkel, of Berlin, that in the presence of acute coryza quite notably, sometimes following cauterization of the nose, as a result of difficult eruption of wisdom teeth in the adult, and even sometimes as a result of an inflammation of the nasopharynx and lateral columns, a tonsillitis has supervened. Of course it is purely a secondary process as we could easily observe clinically. For years the fact was impressed upon me that if I could get children past the sixth or seventh year without doing the then universal clipping tonsillotomy, the child would seem to grow out of the necessity for these operations and would go on to the developing of a perfectly healthy, normal individual. Sometimes the indications seemed to be absolutely certain and conclusive that operation was necessary, and for some reason or other it was deferred, not from any advice of mine but because of circumstances which supervened, and the necessity passed by; the tonsils shrunk, the adenoid retreated, and the patient grew and waxed strong. All of these observations had been clinically thoroughly and frequently observed, but it had not occurred to me to attribute the cause to any given source. Especially the last suggestion as to the child from six to eight years. I had been at a loss to account for the observation in any intelligent way until I read a paper¹ by Dr. George H. Wright, of Boston, where he describes a certain functional relation of the tonsil to the teeth, and wherein he attributes quite properly the cause of the enlargement of the faucial tonsils especially, not merely the lymph nodes in the neck but the faucial tonsils themselves, to the changes in the nutrition of the parts necessary to the proper eruption of the teeth and often resulting from their improper general care. He reported a record of 150 cases where operations on the tonsils have been

deferred, awaiting eruption of the molars, not only in the six year period but in the twelve year period, and when the dentition had been completely accomplished the glands in the neck went down and with them also the tonsils. He suggested the rather ingenious idea that the cervical lymph nodes, in trying to take care of the products of tissue change and tissue formation, being a bit overworked and being unable to do the duty devolving upon them, that, so to speak, certain of the products were pushed back into the lymphatic vessels leading to the tonsils, and that the tonsils themselves enlarged as a result of thus trying not only to do their own work (allowing they had any), but also that which was thus forced back upon them. He apparently proves this by the fact that he has observed so frequently that he feels sure they must be correctly correlated; that when the teeth are properly put in order and the dentition over the tonsil again recedes without further or other treatment.

Ashurst² goes a step further and calls the tonsils even eliminating organs and as the result of cases observed by him thought the sequence of it occurred as follows: First the patient had a cold in the head, then swelling of the glands back of or under the sternocleidomastoid muscle, then finally inflammation of the faucial tonsils, this last swelling being apparent after the glands at the angle of the jaw had begun to swell. His deduction was that the rheumatic manifestation which was present in the tonsils was due to the effort of the tonsils to eliminate that which was forced in upon them. The theory of Wright and his own in a way very closely approximate one another.

Now is there any evidence of a more strictly anatomic or scientific nature which would explain these points? Von Lenart³, in a number of different animals, very conclusively, carefully, and definitely proved that there were lymphatic vessels leading into the tonsil, i. e., that the tonsil was just like all other lymph nodes, had afferent and efferent vessels. Not that he was the only one to observe this, but he deserves special mention by virtue of his careful experiments on animals of various types. He proved, for example, that inert coloring matter injected into the nasal mucous membrane on

one side would not only be found in the tonsil of that side, after a proper length of time, but would also be found in the tonsil of the opposite side, showing that there is a free anastomosis of the vessels of the two sides, and that septic or other matter present in the nose can find a direct channel for passage into the tonsil. This explains, to my mind, all of the varying conditions and clinical phenomena which we have, in the last few paragraphs, referred to. We do not need to ring in either of the ingenious theories of Wright or of Ashurst. Nor need we like Schoenemann⁴ think the tonsils always to be secondarily affected from the nose, but we must admit that it sometimes may be the case.

If one follows the lymphatic channels, as is shown by the work of Gruenwald⁵, even from the accessory sinuses, they will be found to converge into the larger vessels which collect in the region above the soft palate directly over the vessels which must lead into the tonsil, and hence even from the accessory sinuses, matter may land in the tonsil proper. From the teeth themselves, and from any disease of the alveolar process of the palate, therefore, the direct absorption carries that material into the tonsils proper, as well as into the other nodes of the neck, so that the tonsil may not be having work forced back upon it, but is really getting the work at first hand. Also, this knowledge of the lymphatic vessels going directly into the tonsils would very readily explain the observations of Ashurst, which I have happened to see duplicated three or four times within the last year, how the tonsil was directly infected by other portions of the nasal tract.

This also applies very appropriately to the question of tuberculosis. I have on a number of different occasions expressed my belief that the tonsils were only one of very many sources of probable absorption of the tubercle bacillus, as from points in the nose, and particularly in the nasopharynx and lateral columns, and now that it is possible to believe that matter may go from the nose, diseased gums, or alveolar process directly to the tonsil, I am firmly of the belief that some of the cases where tonsils, after removal, have been found to include in their interiors tubercle bacilli, the tonsils themselves are merely doing the work that any other lymph gland

does; that when the tubercle bacilli enter it, the effort is always made to retain them there, dispose of them if possible, and thus not allow them to go further and deeper into the interior, and that these same bacilli came by way of the afferent lymphatics to the tonsils and not through their buccal surfaces.

I want again to voice my surprise that the general surgeon is often so active and so thoughtless in his removal of lymph nodes. The custom as usually carried out would seem to be that if one is to remove tubercular lymph glands, as from the neck, of any patient, not only to remove those that are visibly and evidently enlarged and diseased, but to take out every gland that is visible and even palpable. If, however, one has removed all the nodes, as is, and sometimes must be, done in some of these radical operations upon the neck, so that both the superficial and deep nodes are pretty thoroughly cleaned out, what protection has that patient from absorption from anywhere within the upper air tract? If the lymph glands are supposed to purify the lymph from, and to obstruct the progress of deleterious matter toward the deeper and more vital portions of the body, if these protectors are all removed, what is there left to prevent germs that are absorbed from going directly down into the thorax and deeper lying organs? And if you add to the above the removal of the tonsil, another of the protecting lymph nodes, when matter is absorbed into the lymph channels lying higher up, is there not bound to be some obvious result of this state of things? The natural inference would be that certain forms of tuberculosis would be more frequent, just from all this surgical activity, if for no other cause, and I have been rather expecting to hear it from some source. If any of the contentions which will later be brought forward as the obvious corollary of some of the observations herein stated are at all reasonable, we shall in the next ten or fifteen years discover that certain things will result, and the first statement which I have heard of anything of the kind that seems to be in line with the above is that of Dr. E. Hermann Arnold, of my town. He feels confident that bone tuberculosis, especially in children who have had their cervical lymph nodes generously removed, is more frequent than it ever used to be. I believe that his observation will certainly be duplicated by that of others.

The only possibility which allows one to escape from the logic of what has just been presented, viz., that if you remove a lymph node, you remove one of the guard which is protecting from the invasion of germs and infected material, and every one removed is one less to help and protect (and the tonsil now, in view of well ascertained facts, has to be put into the same category as any and every other lymph node, and that when it is completely removed for other causes than absolute inherent disease, a definite force for good has been taken from us)—the only way we can avoid the logic of this, I say, is to definitely state that we are all wrong as regards the office of the lymph node, and this is untenable.

Did one desire to have any further proof of the extreme probability that the tonsil is to all intents and purposes a lymph node, all that is necessary is to look at a microscopic section of a cervical lymph node and one from one of the beautifully artistic results of the modern tonsillectomy, both prepared in the same way. The arrangement of the hilus and body of the gland may vary a bit, the embryologic origin is somewhat different, but the picture, when looked upon in a general sort of way, is so evidently similar that one could not for a moment believe that the functions of the two could greatly differ.

I cannot sympathize much with the viewpoint that the tonsil has an internal secretion, other than the fact that it may contribute lymphocytes to the general circulation as do all other lymph glands, but until it is generally proved that other lymph glands have an internal secretion, I am not prepared to admit that the tonsil itself has.

The question arises, how much of its enlargement is surely like that of other cervical nodes, i. e., one for which it is itself not at all to blame? It enlarges, presumably, in performance of its function, and its function is not wholly to absorb through its surface. In fact, it may do exactly as Ashurst suggests; it may try actually to eliminate. Brieger and Goerke have expressed their belief in their so-called *Durch-Stroemungstheorie*, which is to the effect that there is a constant flow of lymph from the interior of the tonsil through to its surface, and not only that leucocytes and lymphocytes occasionally wander through to the surface, but that there is an actual fluid outflow through the interstices

of the epithelium, exactly as there is in the nose through the interstices in the nasal epithelium, and this outflow especially protects in the case of the tonsils from the influx of the germs from the surface and that the impurities are thus washed to the surface and carried out and swallowed. Only when this flow ceases, owing to internal or local conditions, could infection take place. This I am not prepared either to accept or condemn, but it certainly shows that other functions are to be conceived than that of merely soaking up from the surface as does a sponge, which has been all that has ever been credited to the tonsil in the older ideas.

O. Levenstein, of Berlin, who is associated with Fraenkel in the Berlin Policlinic, has done as much individual work and spent as much thought on the question of the function of the tonsil as anyone whom I have been able to discover in recent literature. Certainly, he has a right to state almost *ex cathedra* a definite opinion. After a review of all the theories that have been advanced, the protective, the absorptive, the *Durch-Stroemungstheorie*, the theory that it possesses a function, as suggested by the experiments of our own George B. Wood, of contributing largely to the production of white corpuscles from its epithelium, that all adenoid tissue has this function, after giving all credit to the ideas exploited by all authors, ends up with the confession that he feels that every one and all of them fall short of expressing definitely what the function of the tonsils is. He leaves you entirely, in a way, without a leg to stand upon; finding evidence which seems to contradict that any one of these theories is the sole function of the tonsil. In this last I believe that he is right. I believe that no one single thing explains what the tonsil does. It may do all of them, but I think we can safely assume that it is absolutely, in every sense and in all senses, a lymph node, and as such should be protected from rude destruction. Whatever its humble office may be, it had better be allowed to perform it; if not, some other deeper lying node has got to do it. And when this deeper node does, by any chance, protect from an invader which the removed tonsil should have held up, the septic matter is nearer the more vital portions of the body by having gotten beyond the first barricade. This idea certainly comes comfortably to my support in the con-

servatism which I have always exercised in the treatment of tonsils in the adult. I have for years in them followed out the practice suggested by what I did for the Vassar student, freeing the pillars of the palate, slitting up the crypts which burrow and underlie the surface, getting rid of all retention spots, and shrinking the tonsil by ignipuncture. If very large, naturally, diminishing the size by punch forceps or by removing the larger portions by scissors or guillotine, but rarely tonsillectomizing. I feel that I have been able to do for my patients, safely, comfortably and thoroughly, all that has been done by the other methods. I trust that I may be understood that in this respect I am speaking of routine procedures. When I believe a tonsil is thoroughly diseased I presume no one of you is more thorough in removing it than am I, but it is only when I think it is thoroughly diseased that I have done so. The chief dependence for the shrinking other than by the occasional clipping has been the galvanocautery ignipuncture method. Each of us has our habits, as I have said before in this paper, and this has been mine.

It has been with peculiar pleasure that I have read Levinstein's article in the last number of *Fraenkel's Archives*, where he, from entirely independent observations carried out carefully and for years, comes forward with the plea that it is often unnecessary to do anything more than to thoroughly slit up and shrink the upper lobe of the tonsil. He quite truthfully insists that by far the most frequent source of the quin-sies from which people suffer is the upper lobe of the mass. If this is properly freed and opened and taken care of, that is all that is necessary in a great many cases. In his usual thorough way he goes at great length to explain and justify the position which he has in a way empirically and clinically observed to be perfectly true, and it is with singular pleasure that I in my humble way speak in confirmation of what he has said and claimed. As he wisely says, if there be any function to be attributed to the tonsil, you at least leave a large enough portion of the tonsil behind, in this way, so that it can readily perform its duties.

Now, if there is any wheat amidst all this chaff so cheerfully borne by you in its tedious presentment, it must be this, that as to the young the lymphatic system is a necessity, we should let the young have all of it, unless removal of any portion of it is

necessary because of disease. If at any time of life tonsillectomy is to be criticized, it is in the young child under six or ten, and my plea which might at this junction be termed a wail, is that by everything logical we ought to refrain from the beautiful and satisfying operation of tonsillectomy, as a routine procedure in our clinics, until after the tenth year, unless for known disease.

Healthy, normal adenoid and tonsil tissue is formed before birth and increases for a certain time, and afterwards shrinks and disappears, just as does the thymus gland. The really ideal normal child always has his tonsils, and, like all our organs, they do their work without our being conscious of them while they remain normal. This surely, then, suggests a certain stated function.

Apparently the first part of the ring of adenoid tissue in our throats to possess a function is the pharynx tonsil. Later, when dentition starts, the faucials show activity; and later still the lingual tonsil. When retrograde processes start the atrophy first shows in the adenoid, and later still the faucials start to shrink. At forty the lingual tonsil may be still active. This suggests that a certain amount of activity of this tissue is all our life long necessary for the proper wellbeing of our bodies. Now, why should we thus ruthlessly remove in childhood all of that tissue which we can lay our hands upon, when all the logic of events is that some of it is surely needed? Have you not all of you contemplated how much this sometimes is when you have done a complete adenoidectomy and a pretty enucleation? It seems so satisfying, and one sort of pats himself on the back, as he contemplates how every bit of the tonsils is there, all within its capsule.

It would seem logical that we cannot do this indefinitely to young children without some penalty, and I feel positive that in ten or fifteen years from now we will all know what it is that we have done. Without doubt some of the little folks from whom we have removed so much tissue are going to need more than they have left. Then we might expect early enlargement of the lingual tonsil, and the lateral columns of the pharynx will be found projecting into the throat, and no doubt by their clinical manifestations will give us still something to do when there are no more tonsils to enucleate.

Already, as a sign of the times, I might chronicle the fact

that I have this year seen my first three cases of quinsy of the lateral columns of the pharynx. Each was a well defined abscess just above and behind the palate, and each of them was associated with profound systemic disturbance and marked and very threatening edema glottidis. In two of the patients only rudimentary tonsils existed, one having had two operations on his tonsils.

Living as I do in a small community, I see more of my successes and failures than do many of you in the larger cities, who never surely know very much of what happens to the hundreds and thousands of your clinic patients. The greater the city, the less you can follow even your private patients. For years I removed only adenoids in an attempt to study the problem, in children rarely doing even a radical tonsillotomy unless the tonsils were either diseased or markedly obstructive. What has been the result? A varied one, as might have been expected. Some faucials enlarged; some did not. But some took better care of their throats and teeth. Some had better noses. Some did not need the tissue, and others did. Those who did, many of them, never had the slightest trouble from the tonsils which enlarged in response to needs of the system for tissue of that kind. The large, discrete tonsils were without symptoms. Only the adherent, sunken ones ever made any trouble. When the children got older, the discrete but sometimes too large tonsils shrank away, and nothing ever happened. I have only a very few times, remarkably few, ever had the slightest reason to wish I had removed more: when I did, the children were old enough so that a little shrinkage by ignipuncture was all that was necessary. And if this tonsil tissue was any protection, then they surely had all such advantages.

It might now be asked, when we suddenly remove these large amounts of adenoid tissue from our small patients, why don't we observe some bad results, if this is so disastrous to them? This I have already said I believe will surely be chronicled if all of us, in a perfectly judicial spirit, observe while we watch and wait. What the function of the tonsil is must soon be learned if all that we have said has any bearing. It is rather suggestive, and I have often wondered if there is any connection between the frequently observed appendicitis in children who have had both tonsils and adenoids thoroughly

removed. Both are certainly adenoid structures. Much more has been said about the appendix, also, since the arrival of grippe in our land. And here, too, I have wondered if the grippe is not also responsible for sending astray from the straight and narrow path of normal procedure many a tonsil and adenoid. Might they not have grown big from trying to defend our systems from the grippe inroads?

By thinking along all the various lines, I believe we shall be able to deduce, as I have said before, something interesting and instructive.

In conclusion I want to commend the following thoughts as being perhaps more applicable to the younger generation who are to follow us to the front ranks of the workers in this line of activity:

First, that logically tonsil tissue must have a function, and if so, it is to the young that it is of most value.

Second, if it is necessary to operate in children upon the faucial tonsils which are merely large and not diseased, then there are surely perfectly safe, sane, and effective methods other than complete tonsillectomy to deal with the problem. Be thorough with the adenoids, but save some healthy tonsil tissue.

Third, while what has just preceded may apply perfectly well to adults, in them the evidences of disease may be so apparent that radical procedure against the tonsil is surely justifiable; and then, by all means, do a tonsillectomy, in any one of the admirable ways which you gentlemen have been so prominently identified in developing to a perfect detail.

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XLI.

THE TECHNIC OF TONSILLECTOMY.

By J. M. INGERSOLL, M. D.,

CLEVELAND.

A few years ago, when the complete enucleation of the tonsils began to be generally advocated as the best method of treating pathologic conditions of the tonsils, we tried in our dispensary at Lakeside Hospital the various operations advised by different men and gradually evolved the following operative technic:

Ether is used for the anesthetic and enough is given to completely relax the muscles of the jaws. Then a self-retaining mouth gag (Whitehead's) is placed in the patient's mouth and the patient is moved along on the table so that the head hangs freely over the end. One assistant sits on the left and holds the head firmly with both hands, turning it slightly to the patient's left side when the left tonsil is being operated upon, and vice versa for the right tonsil.

A second assistant stands on the patient's right side, holds the tongue depressor with his left hand and sponges with his right. A fairly broad, flat tongue depressor is used, its distal end being bent downward slightly so that it can be hooked down back of the tongue and thus pull the tongue forward as well as depress it. The operator sits at the end of the table with the patient's head directly in front of him so that the relative position of each tonsil is the same. If daylight is used, the operator's back should be toward the window.

One tonsil is grasped with a pair of forceps and pulled forward and inward toward the median line. Then the mucous membrane over the superior part of the tonsil just in front of the anterior pillar is cut with a pair of scissors.

This primary incision should be carefully made through the mucous membrane only. When the incision extends down into the tonsillar tissue the tonsil itself is more liable to tear

and the dissection becomes difficult or almost impossible. Usually the glistening capsule of the tonsil can be seen through the primary incision. A blunt dissector is inserted behind the capsule, and the velar lobe of the tonsil is freed from its attachment to the anterior and posterior pillars and the surrounding tissue. If the blunt dissector does not separate the tonsil from the surrounding tissue when moderate force is used, then the firmer attachments are severed with the scissors. In this way the tonsil with its capsule is dissected entirely free from the anterior and posterior pillars and from its attachment superiorly and somewhat inferiorly.

A considerable part of the successful enucleation of the tonsil depends upon the careful dissection of the superior portion of the tonsil and its capsule. When the dissection is complete the tonsil should be so free that it can be easily drawn out beyond the faucial pillars.

The wire loop of a Tyding's snare is placed over the tonsil, which is then grasped with the forceps, one blade in the supratonsillar fossa and the other in the inferior part of the tonsil, and pulled forward so that the whole tonsil extends through the loop. It almost goes without saying that caution should be used to see that the uvula is not caught in the snare. The snare is closed slowly, and it naturally follows the line of least resistance—namely, the attachment of the capsule to the surrounding tissue—and the tonsil with its capsule is shelled out from the tonsillar fossa.

A gauze sponge is then packed into the fossa and held in position for two or three minutes by firm pressure with the index finger while more anesthetic is being given if it is needed. This firm pressure usually stops the bleeding, and when the sponge is removed the fossa is carefully inspected. If there are any bleeding points they are grasped with ordinary hemostats and twisted. If an artery large enough to spurt has been cut, it is grasped and a buried catgut ligature is passed around it and tied tightly. We have found that unless the ligature is anchored in the tissue around the artery, it is liable to slip off and cause secondary hemorrhage. In other words, tonsillar hemorrhage is dealt with in exactly the same way as hemorrhage in any surgical operation and is controlled by pressure, torsion or ligation.

The second tonsil is then operated upon in the same way,

and when the hemorrhage in each fossa has been completely stopped an adenotomy is done, if necessary.

The patient is kept in bed three days and is given soft or liquid diet. The only after-treatment is an alkaline mouth wash. Sprays, gargles and local applications are contraindicated.

The operation is always done at a hospital or under favorable circumstances at the patient's home. Ether is used for the anesthetic in adults, as well as in children, for it has been our experience that there is more liability of considerable hemorrhage in an adult than in a child, and the hemorrhage can be more easily controlled under general than under local anesthesia.

We do not claim any particular originality for this method of operating. The position of the patient has been fully described before and is known as the Rose position. This position offers some decided advantages over the other positions commonly used. It is equally good for the use of direct or reflected light. The relative position of each tonsil is the same. The blood tends to gravitate into the nasopharynx, away from the field of operation, and is less liable to be inspired. The operative field can easily be sponged and kept clean by an assistant. Severe hemorrhage can be more accurately observed and efficiently controlled.

The various steps in the operation are the same as or similar to those of other men. We think that a cleaner and better dissection of the tonsil can be made with an instrument devised for this purpose than with the finger. Our method of dealing with hemorrhage is, as far as we know, somewhat different from that of most operators. In our experience it has been very efficient. The average time necessary for the operation is from eight to twelve minutes in uncomplicated cases. The time needed to anesthetize the patient varies greatly and is usually more than the time used in the operation.

XLII.

THE RELATION OF ENLARGED TONSILS TO
ENDOCARDITIS.

BY ALBERT C. GETCHELL, M. D.,

WORCESTER, MASS.

In the Transactions of the Association of American Physicians for the year 1899 is a paper entitled "Endocarditis Occurring in the Course of Tonsillitis," by Dr. F. A. Packard. While the writer was guarded as to his conclusions, yet the paper stands as a definite exposition of the relationship of tonsillitis and endocarditis, and has been so quoted by other writers from time to time. The question Dr. Packard discussed was a pathologic one, but with the growth of the operation for the complete removal of the tonsil it has become also a practical one. For if so serious a malady as endocarditis depends to any considerable degree upon the presence in tonsils of a causative agent, any operation, however difficult or dangerous, is not only proper but necessary.

There is no question that among throat specialists in the United States there has of late years been a growing feeling of the importance of the tonsils as the portals of entry for the infection of many serious diseases, and one finds this idea gaining ground among the profession at large.

Looking over the literature of the subject among writers on diseases of the heart and diseases of children, I find this view rather cautiously stated by some, while others make no mention of it whatever. Thus, not to attempt an exhaustive list but by way of illustration, Whittaker in "The Twentieth Century of Practice," 1895, Vol. IV, p. 156, says: "The tendency of modern belief is to regard the throat as the avenue of entrance for the microorganisms of rheumatism and endocarditis." Haig-Brown found conclusive evidence of endocarditis in 8 out of 345 cases of tonsillitis. These and other quotations may be

found in Packard's article. Babcock in his book on the heart, page 156, says: "It (endocarditis) has been known to follow tonsillitis and so apparently a local process as furuncle." Holt says (edition of 1910, p. 1140): "Acute tonsillitis often ushers in an attack of rheumatic arthritis, and occasionally acute endocarditis."

The most recent book on diseases of the heart that I have consulted, James Mackenzie, makes no mention of the matter. And also Edmund Cautley, in his "Diseases of Infants and Children," just published, makes no mention of the relationship.

On the other hand, Osler in the article on endocarditis, which he writes in his recent "System of Medicine," speaks in no uncertain terms. He says (Vol. IV, p. 138):

"The tonsils, the mycotic hot beds, are responsible for a great many cases, and if as is now commonly believed the infection of acute rheumatic fever is here nurtured, they take the first rank as sources of infection."

Again, page 139:

"The so-called endocarditis from cold is probably always rheumatic, and of tonsillar origin, and it may occur in the febrile attacks of children as the result of slight or even overlooked tonsillitis."

And again, page 149:

"Much could be done to lessen the number of cases of rheumatic fever, of chorea, and of endocarditis if we attacked more vigorously and more systematically the enlarged tonsils of children. Here is the point toward which our efforts should be directed. A child subject to recurring attacks of tonsillitis or with marked adenoids should have the tonsils or adenoids thoroughly removed. Other measures of local treatment simply trifle with that what is always a very dangerous condition."

Here the question with which this inquiry started is answered, positively, almost dogmatically, by an eminent authority. The tonsils of a child subject to recurring attacks of tonsillitis are dangerous structures, whose complete and thorough removal is demanded to save the child from so serious a disease as endocarditis. It seems to me, however, that even this does not settle the question, but that further study of the problem is needed. I used to think that the relation of tonsillitis—or rather, to be more specific, the relation of chronically en-

larged tonsils to endocarditis was a very definite one. For the last four or five years, however, I have been studying more carefully the cases of enlarged tonsils and adenoids that have come to me for operation, and I do not feel that the causative relation is so definite as I once did.

I have had continuous charge of the throat department at the Memorial Hospital in Worcester for nineteen years. In that time there have been somewhat over 2,000 tonsil operations. Until recently I have done all the operating myself. For the last few years my assistants have done a good deal, but I still exercise close supervision over the work, operating myself one day in the week. For safety of anesthesia it has always been our custom to examine with bare chest the heart and lungs of patients before operation, and if the house physician finds anything abnormal, the matter is brought to the attention of the operating surgeon. These cases include boys and girls up to the age of 16 and adult women. Since I have begun to pay especial attention to the matter, I have been struck with the extreme rarity of heart lesions.

I can recall but one case of undoubted cardiac disease. Of this case I shall speak later. And so of all the cases that have come under my observation in this hospital, in private practice and in other hospitals, while I have found definite cardiac lesions in persons who came for the removal of enlarged tonsils, yet these cases are so few that the complication in my experience is one of great rarity. If, then, enlarged tonsils, which have been subject to recurring attacks of inflammation, are so definite a cause of endocarditis, why should evidence of endocardial trouble in these patients be not only not the rule but the rare exception?

I desire now to cite the case I referred to a few moments ago. It was a boy of 14, with well marked heart disease—enlargement, thrill, apex systolic murmur transmitted to the axilla and heard plainly in the back. He had very large tonsils, and was referred to me for removal of them on account of his heart trouble. At first sight it seemed to be a case where there was a direct relation between enlarged tonsils as such and endocarditis, and so the doctor thought who referred the case. On careful inquiry, however, I found that this was not so. This boy, so far as he and his mother knew, had never had sore throats, and up to two years ago was always well. Then

he was ill with diphtheria, and was at the Isolation Hospital. Since then he has not been so well, and has had to call a doctor from time to time. When he was at Isolation Hospital no note was made of any heart trouble. It is hardly possible that a heart like his could have escaped detection in this well conducted hospital. It is, therefore, plain that his endocardial trouble developed after his diphtheria, and probably as a result of it. His tonsils were removed and examined by a pathologist. They were simply hypertrophied tonsils.

Before much can be gained in settlement of this question, we must have definite ideas of what we mean by endocarditis. Is the pathologic process limited to the lining membrane of the heart, or does it involve to a greater or less extent the heart muscle? If the former, the lesion is much more serious than the latter, for the mechanism of the heart is permanently damaged, by alteration in the structure of the valves. On the other hand, if the lesion which causes the murmur is due to myocardial change and dilatation of the orifices, this condition may be temporary and the heart may later recover its perfect power.

Osler says (*op. cit.*, p. 134): "Infective endocarditis is a valvular, rarely a mural lesion." But later on (p. 136): "In addition to changes in the endocardium there are usually alterations in the myocardium," and (p. 145) "Sturgis very correctly insisted that a majority of the cases are best described as carditis, so frequently are the epicardium and the substance of the heart involved."

Mackenzie (p. 215) says: "One must consider carefully the murmurs arising in the course of a febrile attack, even in rheumatic fever, for the presence of a murmur may not necessarily mean the invasion of the mitral valves by the inflammatory process, but may be due to the tonicidity of the poisoned heart muscle failing and giving rise to incompetence of the mitral orifice, due therefore not to endocardial, but to a myocardial affection. Endocarditis and pericarditis, both acute and chronic, bulk so largely in medical literature, only because an abnormal sound invariably impresses the mind more than an abnormal sign perceptible by other senses, and the easy recognition of a valvular murmur and friction sound has led to the associated symptoms being ascribed to the same lesion."

(See also Thayer "On the Commoner Types of Functional

Cardiac Murmurs," Transactions of the Association of American Physicians, Vol. XXV, p. 75.)

Will not these considerations account for the fact that if children are carefully examined a murmur may be found and a diagnosis of endocarditis made, while later in life this same person may apply for removal of the tonsils and no cardiac lesion be found? This may happen peculiarly in children, in whom a cardiac abnormality may develop without being accompanied by evident symptoms.

This is a case in point: A young girl upon whom I operated last summer for the removal of tonsils. About once a year she had had attacks of tonsillitis. Her parents were people who never hesitated to call the family physician, a careful and competent man. A cardiac murmur was accidentally found in the examination of the gymnasium physician, its existence or heart trouble not having been suspected.

Tonsillitis is common in childhood. Osler says: "Tonsillar infection is universal in childhood." Is acute endocarditis proportionally common then? Gibson, "Diseases of the Heart and Aorta," 1898, page 393, says: "Acute endocarditis is essentially a disease of the active period of adult life, its occurrence being most frequent between the age of twenty and forty." To finish Osler's remark just quoted: "Tonsillar infection is universal in childhood, while rheumatic infection although common only occurs in a comparatively small number of children" (p. 139). Julius Derschfeld says (Allbult's System, Vol. 1, p. 630: "Infective endocarditis occurs between 20 and 40. It is rare in children according to Osler, although he (Derschfeld) thinks it is not so rare."

The diseases which are supposed to cause endocarditis are scarlet fever, measles, smallpox, influenza, erysipelas, pneumonia, pyemia, gonorrhea, tuberculosis, rheumatism, otitis, diseases of the vagina and uterus, empyemia (Gibson).

Researches demonstrate conclusively the invasion of the heart by the specific organisms of rheumatic fever, pneumonia, typhoid fever, diphtheria, erysipelas, influenza and various septic infections. (Mackenzie, page 214.)

Whittaker ("Twentieth Century Practice," page 156) gives in addition to those already mentioned, osteomyelitis and periostitis, furunculosis, dysentery, malaria, and says: "It is universally admitted that even the most trivial infection may be

followed by endocarditis. Thus endocarditis has been observed after infections as inconsiderable as quinsy and mumps." That is to say, many, probably all the general diseases which are due to a microorganism, may produce heart disease. Of these, rheumatism, in all probability a germ disease, is more liable to cause heart infection, which locates on the valves. It is true also that other infections, more likely to be local than general, may produce the same result, such as septic infections. The mouth, being the opening of the body most accessible, it seems that the point of entrance of the infecting agent would be there, and it is undoubtedly true that it is in many instances. Moreover, if the structures in the mouth are inflamed or diseased, resistance is lowered, and infection is more liable to take place. In this way chronically enlarged and inflamed tonsils would, and undoubtedly do, make the throat more liable to infection. But it does not follow that the tonsils themselves are the necessary and sole foci of infection. Thus, a careful reading of Packard's five cases shows that in only one of them were there swollen and inflamed tonsils, that is, a typically acute tonsillitis. One of the cases had a slightly inflamed tonsil with an enlarged cervical lymph node of the same side. The second had a mild angina with catarrhal inflammation of the pharynx. The third had greatly enlarged and acutely inflamed tonsils. The fourth had pain in swallowing, and on examination the mucous membrane of the fauces and pharynx was found to be swollen and reddened, and the submaxillary lymph nodes were plainly enlarged. The fifth had a slight sore throat, and Dr. Packard's services were called because of a glandular swelling on the neck a few days later. I quote these cases thus fully because this paper has been so often referred to. It is evident that there was in all these cases an infection of the throat, but it is not evident that the tonsils were in all of them either the cause or the avenue of the infection.

Sore throats,—anginas as they used to be called,—even in children, are not all due to inflammation of the tonsils. They are very often due to an inflammation of the glandular tissue of the pharynx, even an infection with a deposit simulating diphtheria starting here.

I have under observation now an adult, a nurse in a hospital, whose tonsils I removed, with the main intent to put a stop to infective sore throats. The tonsils were thoroughly removed,

but she has had the sore throats which excite suspicion of diphtheria as she did before, and she tells me of a friend who has a similar experience.

In adults a not uncommon cause of a sore throat is an inflammation of the lateral columns of the pharynx. The pain and other symptoms in this variety of sore throat simulate tonsillitis, and might very well be called tonsillitis by practitioners not accustomed to carefully inspect the throat with a good light. So that we should be cautious in concluding from the mere fact of sequence of sore throat and endocardial symptoms that the initial disease was tonsillitis. But, if in a certain number of cases the sore throat is due to tonsillitis, and endocarditis follows this sore throat, the question still remains, were the tonsils the accidental or the essential foci of infection?

The question here is not, does endocarditis follow in a considerable number of cases attacks of tonsillitis, especially in persons who have rheumatism, which clinically seems well established; but does the enlarged tonsil, by and of itself, contain the infecting agent likely to produce the disease? If this is so, endocarditis associated with enlarged tonsils should occur most frequently in the period of life when tonsillar inflammation is most common, which it does not, and persons having enlarged tonsils should show not rarely but frequently signs of endocarditis, which in my experience is not true.

An answer to this question should be found in the study of the bacteria of infective endocarditis and of the bacteria of the tonsils. It would seem from the studies of Libman and Cellar ("Observations on the Etiology of Subacute Infective Endocarditis," Transactions of Association of American Physicians, Vol. 25, p. 5) that we are getting to a definite knowledge on this subject. The next step will be to study the bacteria of the tonsils, and see if they correspond to those found in the cardiac lesions, and if they may be made to produce endocarditis experimentally. This Dr. David J. Davis of Chicago has done. He has reported upon this work in a short communication in the *Journal of the American Medical Association* for July 2, 1910, page 26. This report and a personal letter from him indicate that our knowledge of the bacteriology of the tonsils is very imperfect and inadequate; that the whole subject must be gone over again and newer methods employed. He finds his own work far from conclusive, and at present states only facts,

refraining from any general conclusion. He finds that the bacteria of the crypts are of one kind, and those of the surface another. The bacteria of the crypts injected into rabbits intravenously, almost invariably localized in the joints and tendon sheaths, but they in no case produced endocarditis. On the other hand, in one instance he succeeded in producing endocarditis with an injection of the surface bacteria. These bacteria he cautiously concludes are the same that have been found in the blood in cases of chronic infective endocarditis by Rosenow and others.

To make a general statement, so far as one can be made at this time: the tonsils, lying as they do in the outer portals or vestibule of the digestive and respiratory tracts, are organs upon which certain bacteria lodge, and the infection of the tonsils with the bacteria cause an inflammation of the tonsils, and later within the system these same bacteria may cause an inflammation of the heart. Hence the sequence in time of tonsillitis of endocarditis. But the tonsils are the accidental and not the essential agents in this infection.

Early in this paper I said that its object is a practical one. It is this: So far as enlarged tonsils have a relation to endocarditis, when is the operation for their removal indicated, and what kind of an operation should be done? Before answering this question it may be well to review briefly the present status of opinion on these two points in reference to the general question of tonsil operations.

In a recent paper by Guy L. Hunner, on "Chronic Urethritis and Chronic Uteritis Caused by Tonsillitis" (*Journal of the American Medical Association*, April 1, 1911, p. 937) the following paragraph may be found:

"In a comparatively recent paper Rosenheimer has reviewed the literature and found the following list of ailments ascribed in certain cases to tonsillar infection: aneurysm, appendicitis, erysipelas, and a number of other skin manifestations, meningitis, iritis, pleuritis, pericarditis, pneumonia, paraplegia and strabismus, parotitis, nephritis, osteomyelitis, phlegmon of the lower extremities, oophoritis and orchitis, septicemia, typhoid beginning with an angina, and tuberculosis."

We are told by reputable men that at the base of innocent looking tonsils lie foci of disease, and that every particle of

tonsillar tissue should be removed to prevent serious systemic disease.

The character and type of operation generally practiced now may be inferred from the instruments used. I counted in a recent instrument catalogue 64 varieties of tonsil knives, many sharp and pointed.

At one of our best medical schools recently I saw a child brought before the class for operation. The child was profoundly etherized and put in the upright position, and the instructor told the class that the present method of operation required the complete etherization, and that nothing else would do. The tonsils were then removed by the dissection method.

In a recent paper (*Boston Medical and Surgical Journal*, Vol. 164, No. 12, p. 415) Dr. E. A. Crockett says: "Twelve deaths have occurred in and about Boston in the last two years following the removal of tonsils, besides a large number of considerable hemorrhages that would have been fatal unless checked by experienced hands." Is it not time to pause and ask if the operation for the removal of tonsils as at present practiced is necessary, and if this toll of mortality is justified?

So far as endocarditis is concerned, I am convinced that a simply hypertrophied tonsil has little to do with it as a causative factor; that when it happens to have been inflamed before the onset of endocarditis, the infection has been on the surface of the tonsil, and has not started deep in the substance of the organ, and that the removal of the tonsil has little effect on the incidence or recurrence of the disease, except, if it be subject to recurring attacks of inflammation, it in so far makes the tissues about the pharynx, including the tonsil itself, more susceptible to infection.

It is beyond the province of this paper to discuss the relation of the tonsil to other diseases. But I infer it is the same. An uninfamed simply hypertrophied tonsil has slight causal relation to systemic disease. An inflamed and diseased tonsil may have such relation, and undoubtedly does in a limited number of cases.

The indications for removal, so far as this question is concerned then, are, is the tonsil subject to recurring attacks of inflammation, or is it evidently diseased? If the tonsil is simply hypertrophied, such removal, either in whole or in part, as will prevent future attacks of inflammation is sufficient. If it is

evidently diseased, and especially if buried and bound down by inflammatory tissue, it must be thoroughly dissected out.

In my experience, an operation with the tonsillotome is adequate for the first class. The instrument I have used now many years is a modification of the Mackenzie tonsillotome. Since the operation for the complete removal of tonsils has been practiced, I have slightly modified my method of operating, and have found that a complete removal can be accomplished by this instrument.

This operation in experienced hands, in most cases, removes the tonsil as thoroughly as it can be removed by any operation, and in my opinion is as safe as a tonsil operation can be. In inexperienced hands, while the operation may not be as complete, the risks of serious accidents are slight. The operation for the removal of tonsils of the second class by dissection methods is a difficult, and in inexperienced hands a dangerous one. It should be undertaken only by operators of mature experience and skill, and as Dr. Crockett has truly said, by those able and ready to meet dangerous complications that may arise.

XLIII.

CASES OF LATE SECONDARY HEMORRHAGE
AFTER TONSILLOTOMY.*

By F. E. HOPKINS, M. D.,

SPRINGFIELD.

The last two or three years have brought me an unusual number of cases of hemorrhage, both primary and secondary, after tonsillotomy. These have been almost wholly among adults. Seeking a cause for this experience, I find a greater number of adults have within that time insisted upon the use of a general anesthetic. Primary hemorrhage, especially with adults, is more profuse under a general anesthetic, and it is possible that I have been more radical, and the deeper removal involves a greater liability to hemorrhage on the separation of the slough.

Thus far only inconvenience to patient and physician has resulted. The operations have been done at the hospital and the patients kept longer under observation. Pressure with the tonsil clamp has promptly controlled the hemorrhage, and while this method may seem crude, it is so readily employed by the house officer and is so effective that it may well be relied upon.

Confident that hemorrhage, primary or secondary, can easily be controlled, it was not my purpose so much to discuss the subject as to place on record some instances of late secondary hemorrhage, and so I offered "Late Secondary Hemorrhage" as a title for this case report. For many years I have felt secure if the sixth day passed with no bleeding, and while in literature one chances upon a rare report of hemorrhage as late as the twelfth day, no such case had come under my observation, nor have I heard its occurrence referred to in discussion. The following are illustrations of late secondary hemorrhage:

*Read at the Thirty-third Annual Congress of the American Laryngological Association, held at Philadelphia, May 29, 30 and 31, 1911.

Case 1. T. M., boy, age 7, in good health and no family history of hemophilia, operated upon under ether June 21, 1910. Submucous removal of septal exostosis; tonsils and adenoids. Reported over telephone June 30th that at 5 a. m. patient awakened vomiting blood swallowed during sleep, and, according to parents, a large quantity. This was repeated at 4 p. m. of same date, but in smaller quantity.

July 2nd.—Bleeding continued at intervals, and at 12 m. prostration was so marked that I was requested to call. Nasal wound healed; right tonsil healed; bleeding from left tonsillar space; patient very pale; rapid, weak pulse; restless, and at intervals vomiting of swallowed blood. Clamp applied and bleeding controlled.

July 3rd.—The attending physicians, Dr. Fay and Dr. Shores, reported no more hemorrhage and added a further and interesting statement—from its possible causative bearing—that the child showed a well marked eruption of measles.

Case 2. Wm. A., 19 years old, of poor resistance and rather bad family history—father dying of tuberculosis—referred to me by Dr. Ward of Springfield. Nasal respiration obstructed and in addition he had adenoids, hypertrophied tonsils, and lymphoid hypertrophy at the base of the tongue. He is in poor health, his invalidism induced by an endocarditis which left a badly damaged heart, the lesions remaining being both obstructive and regurgitant. The strong pulsations communicated to the larger vessels give the water-hammer pulse. The tonsils were lifted with each pulsation in a way to suggest danger in their removal. Dr. Ward was firm in his opinion that operation was necessary because of the frequent throat infections and the severe systemic disturbance attending such infections.

The tonsils were removed at my office under cocain anesthesia, May 12, 1911, the Farlow punch being used. Very little bleeding attended the operation. The patient was taken to the Springfield Hospital, where he remained three days. He was driven to his home, a journey of twenty miles, and put to bed.

Early on the morning of the 17th hemorrhage began and continued more or less during the day. I saw the patient at 9:30 p. m. Bleeding had ceased and both tonsillar spaces were filled with clot. Vomited blood in quantity was exhibited by the nurse. May 22nd, further hemorrhage occurred, and by

this time the family were panic stricken and a second visit was necessary. An oozing which had continued for five or six hours was still going on from the stump of the left tonsil, the right having healed. This soon ceased under pressure but recurred again two days later and in quantity sufficient so that there was again vomiting of swallowed blood and the stools were black and tarry for two days subsequent. Since the 24th there has been no further bleeding.

Recapitulating,—practically no bleeding attended the operation, but a severe secondary hemorrhage occurred on the fifth day, another on the tenth, and still a third on the twelfth.

XLIV.

THE SOCALLED CONSERVATIVE MASTOID OPERATION, WITH A DESCRIPTION OF THE TECHNIC OF HEATH, BONDY, AND SIEBENMANN.*

BY GEORGE L. RICHARDS, M. D.,

FALL RIVER, MASS.

For the surgical treatment of chronic suppurative otitis media the so-called radical mastoid operation is now generally performed by otologists throughout the world. This operation consists in converting into one cavity the tympanum, aditus ad antrum and antrum, with removal of the drum membrane and ossicles, the closure of the eustachian tube and subsequent epidermization of the entire cavity. This operation saves many lives, and in cases of cholesteatoma no other operation takes its place. Its influence on the hearing is always problematical. In perhaps the majority of cases the hearing is improved; on the other hand, it is sometimes made worse. The operation sometimes fails to achieve the desired result so far as the complete cessation of the suppuration is concerned.¹ The radical mastoid operation is an operation of some gravity, distinctly a major operation, and not without risk, not only to the facial nerve, but in some cases to life itself.

Apart from the cases where the radical mastoid operation would seem to be definitely indicated, there are quite a number of cases of chronic suppuration where the greater portion of the drum membrane is still present, and the ossicular chain is apparently intact, but where the drainage is not sufficiently good to bring about cessation of the discharge. Many of these cases have a fair degree of hearing and the operator hesitates to subject his patient to a severe operation for fear of further injury to the hearing. Whenever such a case is operated upon radically it will usually be found that the source of the infection is in

*Read before the seventeenth annual meeting of the American Laryngological, Rhinological and Otological Society, Atlantic City, New Jersey, June 2, 1911.

a diseased antrum, the lining membrane of which is secreting mucopus. This mucopus drains out by way of the attic and tympanic cavity, and the perforation in the drum membrane is maintained in spite of vigorous local treatment applied through the perforation. The whole mucous lining of the tympanic cavity is boggy and swollen and the eustachian tube fails to properly perform one of its functions, viz., that of draining this cavity, hence the perforation persists and the discharge continues.

Ossiculectomy has been performed for the purpose of stopping the discharge, and although sometimes successful, often fails, because the diseased antrum is not properly drained. Again, ossiculectomy can in no sense be said to conserve the hearing.

Reasoning along these lines and dissatisfied with his previous results, even though these were for the radical operation exceptionally good, Mr. Charles J. Heath,² of the Golden Square Hospital, London, took up the problem of draining the antrum and at the same time saving the drum membrane and chain of ossicles. He did this with the idea not only of curing the pathologic process, but of saving and even improving the hearing power in the individual case. His first paper was published in the *London Lancet* of August 11, 1906, and was entitled "The Cure of Chronic Suppuration of the Middle Ear Without Removal of the Drum or Ossicles or Loss of Hearing." In this article he stated that "the radical operation is based on the assumption that the tympanum in chronic suppuration of the middle ear is usually in such a condition that it cannot recover health and function, and must be emptied of its contents in order that the suppuration may be cured, an assumption which is surely supported neither by pathology nor clinical experience." "The tympanum and its contents are not, as a rule, so far diseased as to be beyond repair." "The condition of the eustachian tube has a most important bearing on the result, for unless that passage be in a thoroughly efficient condition the perforation of the membrane cannot heal nor the tympanum be restored to health." The following conclusions were naturally arrived at: that, given elimination of the antrum with its foul discharges and consequent improvement in the patency of the tympanum and eustachian tube, given also operative provision of access to the tympanic membrane for observation and

treatment, and to the aditus,³ it was considered more than probable that the remaining tympanic disease would offer no great difficulties and that the cavity would therefore be restored to health and function. Acting on this assumption, ten cases of suppurative middle ear disease were operated upon, the supuration varying as to its duration from three months to eighteen years, all chronic in type, and all with loss of hearing to a greater or less degree. The results were good as to cessation of discharge and improvement of hearing.

In 1907 a second paper appeared with the same title. In this paper equally good results were reported.⁴ As a sequel to these two papers other otologists began to perform the conservative operation.

In a paper read before the Chicago Medical Society, December 4, 1907,⁵ Ballenger reported ten cases operated on by the Heath method, and stated that the advantages claimed for this operation over the radical mastoid operation were: (a) "The preservation of the function of the middle ear contents and of the membrana tympani; (b) the improvement in the hearing, whereas in the radical mastoid operation the hearing is usually impaired; (c) the perforation in the membrana tympani often closes in a few weeks after the operation; (d) the morbid process in the tympanic cavity subsides even though necrosis and granulations are present; (e) the antrum and mastoid cells are drained into the auditory meatus, thus relieving the eustachian tube of the excess secretions. The principle upon which the operation is based is that if complete drainage is provided the infectious process tends to subside." Ballenger's ten cases all showed improvement in hearing and the curative results were as good as those obtained by the radical operation. In the discussion which followed, Dr. Beck reported several cases operated on by the Heath method, in nearly all of whom the hearing had improved, and stated that the operation appealed to him very much, but that the indications for its performance should be clearly laid down. In 1909, Ellett, of Memphis,⁶ published a description of the operation, and in the same year Kopetzky published a critical review of it.¹⁰ There may be other references in current periodical literature.

While at the present writing the operation cannot be called new, it seems to me that it has not been generally adopted largely because the technic and the indications have not been

sufficiently understood. In Mr. Heath's own articles he has endeavored rather to justify his position than to describe his technic, his own descriptions of which have not been sufficiently detailed. I visited him recently and he told me there was no complete description of his procedure in print. I therefore requested the privilege not only of seeing him operate, but of describing the operation. He very kindly acceded and allowed me every opportunity to carefully follow two operations and to write the description at the same time. This description has been carefully revised by Mr. Heath, who has gone over every point in much detail, and elaborated and emphasized, so that what follows is really Mr. Heath's description of the operation, and the most complete yet published.

The patient is prepared for operation in the usual way, except that no hair is removed. When anesthesia is complete a sterile flat sheet of rubber, twenty-four inches square, and with a hole near each of its margins, varying in size for different ears, is stretched tightly around the head and so shaped, by means of a large and a small pair of clamp forceps as to form a well-fitting cap. This avoids the removal of any hair and the two clamps maintain the position of the cap throughout the operation.

The upper part of the ear is drawn as little outwards as will enable the surgeon to use the knife, and the incision commenced one-third of an inch behind the temporal artery and on the same level as the highest attachment of the ear to the scalp. It is then carried backwards to this highest attachment and thence in the angle where the skin of the ear and the skin of the scalp join, all the way down, until it reaches the level of the bottom of the concha. This incision goes through the skin only. With the ear pulled strongly outwards the dissection is carried between the concha and the temporal fascia above, and between the concha and the pericranium behind, until the cartilaginous meatus is reached on these two aspects. The bleeding vessels are all clamped, and during the dissection, the knife is so held that the edge is directed toward the ear; thus the temporal fascia is maintained intact. There is more bleeding when the incision is made at this point than farther back. Thus far none of the pericranium has been cut, nor any of the mastoid bone exposed. The knife is now entered, pointing in an upward and inward direction, between the meatal cartilage and the lower

edge of the temporal fascia, until it reaches the margin of the bony meatus just in front of the spine. The edge of the knife should point backward and should damage neither of the two structures between which it is placed. It is then made to cut horizontally backwards nearly to the skin on the mastoid. The knife is then taken out and its point inserted close to the skin and then carried forward to meet the first part of the incision, thus avoiding any liability of injuring the skin behind the ear. This incision passes over the meatal spine and divides all the tissues down to the bone. The knife is then entered close to the meatal spine, and made to cut downwards in a curved line, in harmony with the back of the cartilaginous meatus and as closely as possible to it without injuring it. This cut divides all the pericranial tissue down to the bone, and extends to the bottom of the orifice of the bony meatus. From the lower end of this incision another one, parallel with the first pericranial incision, is carried for a short distance backwards through the pericranium. It is difficult to cut backwards in such a confined area, and the knife is best reversed, so that its back touches the skin on the mastoid. In that position it is pushed forward through the pericranium until it reaches the cartilage of the meatus. These three incisions form the three sides of the pericranial flap which is next separated from the bone with the periosteotome, and pushed back nearly to the skin still attached to the mastoid, folded a little under the skin, and held in place by a small special clip designed by Mr. Heath for this purpose. This clip takes its purchase farther back in the skin of the hairy scalp. An area of mastoid bone about three-fourths of an inch vertically, by about one-half inch horizontally now lies uncovered. The cartilaginous meatus is next separated from the posterior bony wall with one of Mr. Heath's special separators, so designed as to avoid injury to the soft structures. The ligament holding the cartilaginous meatus to the spine (called the coronet ligament by Mr. Heath) is divided with a knife held with point backward to avoid injury to the soft meatus. As a rule the knife is also required to separate the meatus from the temporal fascia in front of the spine so that the roof of the bony meatus shall be visible and accessible. The special retractor is now inserted into the meatus and the detached portion of the cartilaginous meatus compressed against the front portion, which is never detached.

With gouge and mallet the removal of bone is commenced close to the posterior margin of the bony meatus, which margin is taken away from below upwards, in some cases including the spine. The gouge is held as nearly parallel with the surface of the skull as possible so that fairly thin shavings of bone are cut away. In this way the bony opening is deepened, the posterior wall of the bony meatus being removed at the same time as the bone behind it. The opening is gradually deepened until the meatal wall has been removed to within one-quarter of an inch of the tympanic ring. If the antrum has not been already reached a narrower gouge is used for removal of the bone about one-quarter of an inch behind the tympanic ring. In this situation the antrum can always be found. As soon as found it is oriented (explored) by means of a special bent probe, since the amount of bone to be removed depends upon the size of the antrum cavity beneath. The bony covering of the antrum is next removed. If any cell is found to communicate with the antrum the communication is enlarged, and the cell incorporated in the cavity. The mucous membrane of the antrum is now removed with extremely long handled small burrs of various sizes and attached to the handle at various angles. No bone is removed with these burrs, all bone being removed with the gouges. The latter leaves no bone dust which might complicate by causing suppuration during convalescence. All the mucous membrane from the antrum and aditus up to, and as far as the tympanic cavity is next removed. Care must be taken not to dislocate the incus. Even then the cavity is often so small as to be hardly a quarter of an inch in any direction. The smaller the cavity, the more rapidly it fills up. The antrum and aditus being now clear, a small wet cotton plug is used to wall off the cavity during the subsequent steps of the operation. The floor of the bony meatus is now exposed by separation of the cartilage and the ridge of bone between the outer part of the meatus and the (outer part of the) new opening in the skull cut away so that at the bottom the two cavities form one. If the arch of the floor of the bony meatus is discovered to be considerable it is removed with a very narrow gouge. In order to prevent any slipping of this gouge and damage to the drum head, Mr. Heath uses a special drum shield which is pressed against the floor of the meatus just external to the drum head and which forms a perfect protection to that structure. Hav-

ing removed the arched floor, a further portion of the posterior meatal wall, to within about one-eighth inch of the tympanic ring is cut away. For this he has designed a special forceps.

The next procedure is thorough exposure of the drum membrane. The first step is the preparation of the meatal plastic flap. A special two-edged bent knife is passed into the cartilaginous meatus and made to force its way through the roof of that passage just external to the temporal fascia, care being taken not to injure the fascia. It is then made to cut slightly outwards, or even inwards, if it has not come through at the proper place. For this reason it is double edged. The opening in the roof is at first made about one-third of an inch long. The posterior edge is then held away from the anterior by forceps in the hand of an assistant. The knife is then removed from the inside of the meatus and brought to the outer part of this incision and from its external end it is carried backwards, outwards, and downwards, practically dividing the posterior half of the cartilaginous meatus, down to the floor. When it reaches the floor it should be just within the orifice of the cartilaginous meatus, so as not to be visible from without. It is necessary to bring it as far out as this, for in most cases there is no cartilage on the floor of the meatus farther in, and therefore this incision, if carried directly downward, would practically cut the flap off:—certainly it would destroy most of its vascular supply. A probe is next passed into the upper opening of the cartilaginous meatus so as to define the passage in its whole length. A pair of special bent probe-pointed scissors are next used, with one blade in the meatus and the other above it, and with the probe as a guide the meatus is divided as far as it reaches into the ear. The posterior flap is then detached from its internal attachment, where there is no cartilage, and is for the moment turned completely out of the ear and held there by another special clip.

An examination of the tympanum is now made. On this examination depends the future course of the operation. If a polypus projects from the tympanum it is removed with a special polypus forceps. The condition of the malleus is seen, and the size and situation of the perforation observed. If the perforation is low down the eustachian tube can be examined with a small probe.

The plug previously used to wall off the antrum is now re-

moved, and a specially devised canula, to which is attached a rubber ball half filled with warm boric lotion, is inserted into the aditus and air blown through, the ball being held in such a way that only air goes through. (A bubble coming through a perforation is more easy to see than any liquid.) Having demonstrated with the aid of air that the aditus and attic are clear right through, the ball is inverted and the lotion is sent through the same canula under considerable pressure. If there is any hidden cholesteatoma in the attic or tympanum, some of it will be washed through. In fact, if any is present some of it is always washed through under these conditions and appears like fine sawdust in the lotion. If cholesteatoma be present the ear is, in Mr. Heath's opinion, doomed, and the radical operation must be performed, as he has never seen a cessation of suppuration with cholesteatoma incompletely removed from the attic. If no cholesteatoma is present and the tympanic conditions indicate the possibility of repair, the conservative proceeding is continued. Another small wet cotton wool plug is put into the antrum. It is hardly ever bigger than a pea. A smaller one is placed in the deep meatus, about the size that the passage will comfortably carry. In the antrum the purpose of the plug is to absorb the plastic lymph that will be thrown out and which would be more difficult to remove from the bone than it would be if it became absorbed in the plug, for in septic cavities, such as these, it should not be encouraged because it degenerates and disappears a few days later. The plug in the meatus has a partly similar reason, but it is also used to prevent the swelling of any portion of the meatal wall which would interfere with proper observation of tympanic conditions during the after treatment.

The pericranial flap is now released from the clip holding it and turned forward towards its place again. The bone to which it was formerly attached having been partially removed, the end of the flap falls into the cavity thus left. The meatal plastic flap is next released from its clip and turned downwards and backwards to cover the floor of the new cavity. These two flaps will be found at some part to come in contact with raw flesh. They are united with a catgut suture where they appear to meet most suitably. There should be no tension on this stitch. In order to get free observation of the cavity during the after treatment, the orifice of the cartilaginous meatus is now en-

larged. A scalpel is inserted through the meatus and made to cut upwards and backwards completely through the crux of the helix, so that the surgeon's little finger can be inserted. A drainage tube the size suitable for the bony cavity, usually one-half inch in diameter, is inserted. There must be only slight pressure on the flap, or there may be pain and septic absorption. The inner end of the rubber drain should be pared on two sides to facilitate the entrance of discharge and to diminish its rigidity. The drainage tube keeps the flaps in position and the meatus large, so that observation of the whole area is easy as soon as it is removed during the daily dressing.

The wound at the back is next sutured. Mr. Heath uses coarse silkworm gut stained black, as being easier to see during removal. The needle is passed through both edges of the wound and the ends of the suture brought together, and a double, not a single, twist made. This double twist, when the edges are pulled together in proper apposition, is sufficient to hold them there. The second knot is not tied over it, as Mr. Heath finds pulling the second knot alters the tension of the first and prevents perfect apposition. The stitches at either end of the wound are flush with the end of the incision. This insures perfect apposition at those parts. The end stitches are put in first, then the middle stitch, and nearly half an inch of skin on either side of the wound is included in each stitch. On the conchal aspect of the wound there is very little skin outside the cartilage, and the needle must be passed between the two. The cartilage must not be pierced. Three stitches are applied above and three below the center one.

A large damp dressing is applied and covered with a mackintosh to prevent drying. The following day the outer dressing is taken off, all the stitches usually removed, and a smaller wet dressing is applied. On the next day the dressing is again changed, and also the tube. The internal plugs are withdrawn and fresh ones inserted, after cleansing the wound and examining the cavity. These plugs are moistened in a mixture of equal parts of glycerin and boric lotion to which iodoform is added to the point of saturation.

If the original tube appears tight a smaller one should be inserted, though it is desirable to keep the meatus of full size for the purpose of easy inspection of the deeper parts. As a rule all dressings requiring a bandage are removed at the end

of a week, the drainage tube being covered with a piece of dry wool during the day and a bandage at night. No hair having been removed, the patient is no longer conspicuous. The internal cotton plugs and the rubber tube are worn until the cavity is dry. These plugs are changed daily until the secretion has much diminished and then at longer intervals.

Opportunity was afforded me to examine a number of cases at varying periods after operation. One was seen the day following, and the stitches were all removed at this time. Warm sterile water was syringed from the aditus through the perforation by means of Mr. Heath's special canula. No appreciable scar was noticed after any of the operations. The rubber tube is worn until the external auditory meatus is completely healed and has contracted as much as it is likely to. A case seen the fourth day after operation showed the antrum as a large cavity visibly draining into the external auditory canal. I examined a case three months after operation, of a woman whose ear had suppurated for eight years. The drum was present, there was a cicatrix in the center, but no holes in the drum. Hearing was fairly good for watch and voice, much better, she said, than before the operation. She was still wearing a small rubber tube, but this did not seem to me necessary.

In a woman deaf for forty years, with suppuration in each ear, one ear had been operated on three years before, the other one year before; the antrum was visible in each as a partly filled cavity. There were two perforations in the right ear, one in the left. Both ears were absolutely dry, and there was no detritus. The hearing was fairly good for the voice, much better than before the operation.

If the conclusions as stated in Ballenger's article be correct, then this operation should have a wider vogue, for however satisfactory the radical operation may be from a pathologic standpoint, it is not in many cases a conservator of the hearing, nor does it always cure the suppuration. It is an operation of some magnitude with some risk of facial paralysis, which, temporarily at least, is not infrequent. Mr. Heath, on the other hand, has never had a case of facial paralysis, and there have been no deaths after the operation.

Should for any reason at some future time a radical operation seem indicated, the bridge of bone can be removed and

the drum and ossicles taken out. In Mr. Heath's experience this has not been necessary. Considerable destruction of the drum is no contraindication, as much of it may be replaced.

Mr. Heath's special instruments can be obtained through Messrs. Arnold and Sons, or Mayer and Meltzer, London, though the armamentarium of the average otologist will be found to contain a sufficient number of suitable instruments to achieve a satisfactory result, once the essential principles of the operation are thoroughly grasped.

POINTS TO BE EMPHASIZED.

The radical mastoid operation is to be performed if cholesteatoma is present in the attic, as Mr. Heath does not think this condition can be cured in any other way. Every cholesteatomatous focus must be removed or suppurative recurrence will take place.

The decision as to whether or not a radical operation is necessary to be done is never made until after examination of the drum, and washing out the attic, as up to this point the procedure is the same in all operations, and no ear is destroyed without a full knowledge of the conditions present.

When he performs the radical mastoid the mucous membrane is not removed below the horizontal part of the aqueductus vestibuli, for fear of injuring the stapes region, with resultant deafness. If this precaution is taken, facial paralysis ought not to occur.

Mr. Heath prefers the eustachian tube to remain open, even if the radical mastoid is done, and does not think the so-called failures in the radical mastoid are due, as so often stated, to an open eustachian tube.

The zygomatic ridge is the upper line of the operative fold.

Use a sharp knife and provide a sufficient number of artery clamps to insure a dry wound.

The incision for the meatal flap is not visible in the concha of the outer ear. It ends one-sixteenth inch inside the concha.

Enough bone must always be removed to allow the flap to lie level on the floor.

Adrenalin is used if the oozing is very troublesome.

The lateral sinus is very rarely uncovered during the operation.

The operator sits on a stool and uses reflected light, wearing a forehead mirror; the room is darkened, and sandbags are used to maintain the position of the patient's head. The mastoid is placed sideways, a little more than half way toward the horizontal. Anesthesia is maintained through the nose or mouth by means of vapor through a tube.

OPERATION OF BONDY.

G. Bondy, an assistant in the clinic of Professor Urbantschitch, has also devised an operation designed to effect somewhat the same result as that of Heath. Unlike Heath, however, who operates on some subacute cases, and who distinctly considers cholesteatoma as a distinct contraindication, Bondy operates only on chronic cases, and includes among them cholesteatoma. He was led up to his operation by some statistics of Ruttin. Ruttin collected the statistics of 1,000 cases operated after the radical manner. Of these, patients who before the operation heard only from one and one-half to two meters, had after the operation no appreciable difference in hearing; but the patients who had better hearing than this, showed after the operation a perceptible loss of hearing. Of 100 cases under Ruttin's own observation, there were 40 who heard conversation farther than two meters, and of these, 8 heard better after the operation; in 6 conditions remained stationary, and in 26 the hearing was worse. In 10 of the 26 cases in which the hearing was worse after the operation, there were 10 cases which had apparently an intact middle ear and small perforation, and in these the loss was very considerable. In 2 cases of perforation of Schrapnell's membrane with intact drum membrane, there was a loss of hearing from seven meters to one-half meter. This loss of hearing was probably due to injury of the previously intact ossicles. Bondy reasons from this that cases of apparently intact ossicles, and with the greater portion of the drum membrane present, but with perforation of Schrapnell's membrane, should be operated upon conservatively if possible. He does not regard Schrapnell's membrane as a part of the tympanic membrane proper. The purpose of the operation is the protection or conservation of the drum membrane and the ossicles, hence it is necessary that the ossicles be neither extracted nor disturbed in their relationship.

At the same time, in order to stop the pus discharge, it is necessary that the middle ear cavity be drained as freely as possible, not only for present purposes, but also in case any further operative procedure should be necessary.

The operation is begun after the manner of a simple mastoid, the pericranium being separated from the bone as far as the external canal only, and the membranous canal not dissected away until later. This allows the absolute protection of the middle ear cavity during the opening of the antrum and the cleansing out of the mastoid cells. When this portion of the operation is finished, the membranous canal wall is detached, the bony canal with the bridge chiseled away, and the lateral wall of the attic completely removed. The facial ridge is taken away almost to the plane of the insertion of the drum, and the usual plastic operation for the external canal made. Both flaps of the plastic are fixed in their positions by stitches, so as not to require very strong pressure from the tampon, and the retroauricular wound is sewed up. The resulting cavity, except as regards the presence of the drum membrane and the ossicles, has the same relationship as after the typical radical operation. One must be careful to see that the attic is laid bare as freely as in the usual method of operation. Should the pus discharge, by reason of disease of the head of the hammer or the body of the anvil, it is easy under local anesthesia not only to remove the ossicles, but to leave the case in the same conditions as though the typical radical operation had been performed. This procedure differs from the usual radical operation in two respects; first, the separation of the membranous canal is made after the finishing of the mastoid operation, thus reducing to the minimum the danger of any injury to the sound conducting apparatus during this stage of the operation, and before the removal of the external canal the antrum is made free as far forward as possible, the entire lateral and the greater portion of the anterior antrum wall taken away, so that the horizontal semicircular canal is entirely visible and the bridge made as thin as possible. The second point in which it differs from the usual radical operation is in the complete removal of the lateral wall of the attic. In the conservative operations of Heath and Siebenmann the lateral wall of the attic has either remained untouched or a portion of the same is allowed to remain for the insertion of

the drum membrane. The danger of dislocation of the ossicles is provided for by maintaining the bony external canal until the rest of the operation is finished. As to the necessity of having any support for the drum membrane, Bondy says that the support of the drum membrane in the region of the Rivinian fissure depends not upon bone, but upon ligaments, and that the cutting away of the lateral wall of the attic in no way affects this support. After the operation the form, appearance and movement of the drum membrane remains unchanged. Nor has there seemed to be in any case any undue movement. On the other hand, a radical removal of the lateral wall of the attic is a necessary factor for the cessation of the pus discharge. The after treatment is shorter than after the ordinary radical, and the pain is less, since the attic and the antrum are relatively painless regions, and the cavity of the middle ear is protected. Whether there is any more danger of recurrence of cholesteatoma after this operation is to be doubted, since the cholesteatoma is entirely removed. Here, Bondy is in absolute disagreement with Heath. Heath regards the presence of any cholesteatoma as an absolute contraindication for the conservative radical. The indications for this operation are a hearing distance before the operation of two meters or more, provided it is probable that there is continuity of the ossicular chain and that the middle ear cavity is itself not diseased or but slightly. It is especially indicated where the perforation is limited to Schrapnell's membrane, the drum membrane intact and the hearing good, provided there is no material improvement after a conservative treatment of four weeks.

In the after treatment it is essential that one use light tampons, and that any injury to the ossicles be prevented. I did not have the opportunity of seeing Bondy operate after this method, but I saw one of his cases which had been operated upon, and tested the hearing. The hearing power was good, and no cholesteatoma was apparent. The picture through the speculum was that of a healed enlarged mastoid antrum posteriorly and a drum membrane anteriorly.

OPERATION OF SIEBENMANN.

It is perhaps hardly proper to speak of the conservative operation of Professor Siebenmann, since what I saw him do and what I find described by him⁸⁻⁹ is rather a conservative

type of radical operation than any attempt to save the drum membrane or the ossicular chain. The radical operation as performed by him differs from the radical operation as ordinarily performed, in that all that he does is to remove so much of the bone of the mastoid region and attic as is necessary to make all parts accessible through the external canal, together with the ossicles and the drum. An essential of his operation is his flap, the incision for which is made in the middle of the membranous external canal for two-thirds of the way, starting at the bottom or deepest portion, and then two cuts, one at the right, and one at the left, are made at an angle of about 150° to this, thereby leaving a portion of the flap as a tongue flap, while the lower portion is simply split and lies against the upper and lower walls of the newly made cavity. The curette is not used, as he thinks that nothing is gained in time, the risk to the patient is increased, and the prevention of the reformation of the cholesteatoma is not attained. Siebenmann states that after the healing the covering over the wound surface consists of a layer of epidermis that histologically cannot be differentiated from that of the cholesteatoma matrix. The epidermizing of the uncovered surface, when curetting is not done, is considerably hastened, and the secretion disappears sooner. He has observed the middle ear cavity to be dry for some time, while the edges of the divided membrane of the external canal and the flaps are still granulating. He has not for several years curetted the orifice of the eustachian tube, and since then has no longer noticed purulent discharge from the mouth of the tube. The daily change of dressing and the use of an absolutely nonirritating, very light tampon also helps very much to prevent too exuberant granulation. The retroauricular wound is always sutured.

CONCLUSIONS.

The choice of one or the other of these operations must depend in each instance upon the individual case. That there is a certain amount of risk in the performance of a conservative radical, can hardly be denied, since in these operations it is frequently impossible to completely clear all of the sinuous tortuous spaces which may be involved. Neumann says the sinus tympanicus cannot be cleared in the conservative opera-

tion and that in about four-fifths of the cases the long process of the incus is usually destroyed, and that the saving of the ossicles serves no useful purpose. The two crura of the stapes go very early. If it were not so, the stapes would be torn out in many radical operations. The footplate, on the other hand, is fairly well protected.

Alexander considers that the end results as to hearing in the conservative operation, which he terms "attico antrectomy," are no better as to hearing than after the radical. The Heath operation, he says, can only result in permanent healing if the cause is in the antrum, and a careful study of Heath's cases will show that he has operated far earlier than is usual when a radical mastoid is done. If the cause of the trouble is in front of the antrum or in the hypotympanum, the disease is not entirely removed by the conservative operation. The disease is left in order to save the hearing. If one side has good hearing it is allowable to do a Heath or some other type of radical operation, but the healing is far more important than hearing. So far as useful hearing is concerned, the better side excludes the worst side. In the radical operation there is a danger of some loss of hearing, but there is the chance of healing the disease in the bone. The radical operation is done for healing and not for hearing. The typical radical is therefore better than "attico-antrectomy," since after "antico-antrectomy" the healing may not be good.

Finally, I think cases occur in which the conservative operation is indicated, and it seems to me it is better to do a Heath operation whenever the hearing is fairly good, and the disease is apparently limited to the antrum. I think also that the operation of Bondy deserves further trial. In every case with pronounced loss of hearing, where the disease itself seems likely to endanger life, a typical radical operation is the one indicated. I have not yet had the courage to operate after the manner of Siebenmann, and not curette out the cholesteatoma. Professor Siebenmann is an operator of great experience, and I do not feel justified in criticizing his methods, although I did not find, after seeing many radical operations by various European operators, that anyone was following his example in avoiding curetting. On the contrary, the endeavor was always to remove every portion of cholesteatomous material.

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XLV.

INJECTIONS OF BLOOD SERUM FOR HEMOR-
RHAGE, EITHER SPONTANEOUS OR POST-
OPERATIVE.

BY CLEMENT F. THEISEN, M. D.,

ALBANY.

Hemorrhage after tonsillectomy is always unpleasant, and when it becomes so severe as to endanger the life of the patient, there are very few other complications so alarming and which so tax the resources of the operator.

The following cases are reported to show the probable value of injections of blood serum when other methods fail, or when the patient is so reduced from loss of blood that the administration of another anesthetic for the purpose of suturing the pillars in tonsillar hemorrhages does not seem advisable.

CASE 1. Boy, aged 6 years. Removal of tonsils and adenoids. The tonsils were removed by dissection and snare, the method employed by most operators at the present time, and the adenoids in the usual way.

There was very little bleeding during the operation, and when it was completed firmly rolled cotton tampons just filling the tonsillar fossa were pressed firmly into the cavities and held there for a few moments. This stopped the oozing of blood promptly, and in fact during the past fifteen years, since this procedure has been employed by the writer, it has rarely failed to check all immediate hemorrhage, and probably prevents secondary hemorrhage. The cotton tampons can be either used dry or may be dipped in pure peroxide.

The operation was performed in the morning and there was apparently no bleeding during the day, but in the early evening the boy vomited an enormous amount of clotted blood followed by a fresh hemorrhage.

The boy was so hard to manage and in such a bad general

condition that it was difficult to determine where the hemorrhage came from. But after the exercise of a good deal of persuasion and tact a fairly good view of the throat was obtained, and it appeared that the bleeding came from a point low down in the right tonsillar fossa. Pressure with the finger wrapped with gauze and with cotton tampons soaked in peroxide and adrenalin was used and after a time the hemorrhage stopped. No spurting vessel could be seen. During the night the writer was again called for another alarming hemorrhage. The nurse saved the blood which again filled a large basin. While pressure was again employed the patient was given 5000 units of diphtheria antitoxin, the normal blood serum not being at hand, and this was repeated in two hours.

After the first injection the hemorrhage appreciably lessened and after the second stopped completely. Two more injections of the same amount of antitoxin were used, however, and there was no return of the bleeding.

This may have been a case of hemophilia, because on questioning the mother, who was a rather ignorant woman, she said that there had been other cases of severe hemorrhage in the family after extraction of teeth and other trivial wounds. The boy made a good recovery.

CASE 2. Mr. P. D., lawyer, aged 44 years. Has occasionally been under treatment for slight attacks of acute pharyngitis. His tonsils are slightly enlarged. On the 18th of January he came to the office suffering from one of his usual attacks. This attack differed from the others as the tonsils were also slightly inflamed. He was given a simple astringent gargle, and was told to return to the office if the throat did not clear up. I did not hear from him after his visit to the office, but on the fifth day after that, his family physician asked me to come to the patient's home as soon as possible.

The patient was sitting up in bed breathing with great difficulty. On examining the throat the entire pharynx, soft palate, uvula, tonsils, pillars, and in fact everything that could be seen, was so tremendously edematous that very little air was able to reach the larynx.

With the exception of a few small spots on the tonsils there was no deposit anywhere. Free incisions were made in three or four parts of the edematous area and a considerable amount of serum escaped, but no pus.

There was a good deal of infiltration of the tissues of the neck, and on the following day there was a board like infiltration of the entire neck, with a good deal of swelling.

The difficulty in breathing, which had been slightly relieved by the incisions on the preceding day, was as bad as ever, and on inspection of the throat the edema was just as great. All the tissues were so tremendously distended that they looked like an inflated toy balloon. Four free incisions, as low down in the pharynx as possible were again made, with another free discharge of serum, but no pus and little bleeding. An ice bag was kept around the neck, cracked ice was used in the mouth and an iced adrenalin spray fairly continuously. The incisions again relieved the breathing to a considerable extent.

About an hour after getting back to my office I was told to come again immediately as the patient was having a severe hemorrhage from the throat. I was shown a large basin full of blood, and within ten minutes, after coughing slightly, he lost fully as much more.

An examination of the throat was made as soon as possible, but the origin of the hemorrhage could not be determined. There was no blood coming from the incisions at the time.

The patient was immediately given 10,000 units of antitoxin and the following morning 20 cc. of antistreptococic serum was injected, as cultures taken after the incisions were made showed almost a pure streptococic infection. From this time on there was no further bleeding. The great edema of the pharynx persisted for nearly two weeks in spite of almost daily incisions. At no time was there any pus obtained. The edema of the pharynx as well as the infiltration of the tissues of the neck slowly subsided, but it was nearly two months before the patient was strong enough to get up. Albumin and casts had been almost constantly present in the urine, and for a month the patient ran an evening temperature running from 100 to 103.

So far as the writer is concerned this was a somewhat unique throat condition, and must be similar to the severe pelvic edemas sometimes complicating streptococic infections. The board-like infiltration of the neck suggested Ludwig's angina, but at no time did the condition go on to suppuration, nor was there any involvement of the floor of the mouth. A tracheotomy did not have to be performed, although for two weeks during

the height of the attack the necessary instruments were at hand every day.

CASE 3. The writer was called three weeks ago to see a woman, aged 50 years, who had been having a nasal hemorrhage lasting with few intermissions almost the entire preceding night.

The family physician had inserted a tampon, but the hemorrhage had not been controlled. The tampon was carefully removed, but the hemorrhage was so profuse that the bleeding point could not be located. Another tampon soaked in adrenalin was inserted, but did not check the hemorrhage to any extent. The patient by this time had lost a large amount of blood, and as soon as it could be secured, was given an injection of 10 cc. normal blood serum (horse). This was given late in the afternoon and within a short time the bleeding lessened.

Another injection of 10 cc. was given during the night, with complete control of the hemorrhage and no recurrence after the removal of the tampon.

I do not think there is any doubt that the serum had a prompt effect in this case. The hemorrhage was certainly not controlled by packing and other usual procedures.

CASE 4. Boy, aged 8 years. Had a severe acute tonsillitis followed by an acute suppurative otitis media. The boy's parents lived in the country and did not pay any attention to the ear condition, allowing it to go on for several weeks.

A physician was then called to see him from Albany, and sent him to the Child's Hospital, where he was seen by the writer. The boy was in extremely bad general condition with an extensive mastoid involvement on the left side. His throat was still congested and there was a profuse discharge of pus from the left ear. Temperature 104° F. After being admitted to the hospital the boy had a chill and vomited. The mother stated that he had been having sweats and chills with fever every night for two weeks and some vomiting.

A mastoid operation was performed the morning after he was admitted to the hospital, and while the boy had an epidural abscess and involvement of the entire mastoid process, the lateral sinus after being uncovered seemed to be normal. Blood count before operation showed a leucocytosis of 15,000.

The mastoid wound was left open, that is a good part of it,

and on the following day the boy's condition had greatly improved. He did not vomit again, and with the exception of a slight chill after the operation, his chills and sweats also stopped.

Temperature dropped to 100° F. and his condition improved in every way, but on the third day a severe hematuria commenced, which increased to such an extent that the urine contained a large amount of blood each time. He was put on a diet but became so weakened from loss of blood that we decided to try injections of serum. Antitoxin was used, 5000 units being given each time. After the third injection the urine commenced to clear, and after the fourth the bleeding stopped entirely and did not return.

The boy also made an uninterrupted recovery so far as the mastoid condition is concerned.

He remained in the hospital four weeks and I heard recently (six months after) that he was entirely well.

The question of hemorrhage after tonsillectomy is a particularly interesting one, and is receiving more attention since the radical tonsil operation has been performed.

Most men are agreed now that we really see fewer serious hemorrhages after tonsillectomy than we used to after tonsillectomy.

There are a few points which are probably not new but which have come to the writer's attention in tonsil operations.

After an apparently complete tonsillectomy, a small mass of tissue is sometimes seen low down in the tonsillar fossa at the extreme base of the tonsil. This is entirely fibrous tissue and does no harm if left; in fact it is wiser to leave it, because in the writer's experience some postoperative hemorrhages result if attempts are made to completely remove this.

Weil (quoted by Class*), whose researches in hemophilia were so largely responsible for the present status of serum therapy in this disease, reported in 1907 a series of four cases of hemorrhage from different sources treated with serum.

The only case of interest in connection with the writer's paper, was one of febrile polyarthritis with rapidly developing subcutaneous hemorrhages, epistaxis and hematuria.

Patient was treated with intravenous injections of 15 cc. of

*Serum-Therapy in Purpura Hemorrhagica. The Archives of Internal Medicine, Vol. 6, No. 2, August, 1910.

fresh beef serum, and after one mild relapse was discharged cured.

In conclusion, the writer believes that injections of blood serum for either spontaneous or postoperative hemorrhage appear to be of the greatest value.

The control of hemorrhage after the use of serum cannot be regarded as a mere coincidence, because this method succeeds when the usual methods for control of hemorrhage sometimes fail.

Birkett (personal communication) has recently had a case of uncontrollable nasal hemorrhage in a woman aged 65 years, which could be perfectly controlled with normal horse serum.

XLVI.

INTRACRANIAL LESIONS COMPLICATING ACUTE
AURAL DISEASE.*

By S. MACCUEEN SMITH, M. D.,

PHILADELPHIA.

Modern pathology no longer limits itself to the restrictions imposed by the terms septicemia and pyemia. Such terms belong to a period antedating our conception of modern advanced bacteriology. This science has demonstrated that surgical sepsis and accidental wound infection are not the only etiologic factors, but that there is a variety of pyogenic infections originating in obscure processes and from unknown causes, to which the term "cryptogenetic" (Leube) has been applied.

Septicemia has been designated as a condition in which pyogenic organisms disseminate from a primary focus into the general blood supply, settle, collect, and multiply in the capillaries. In pyemia they are disseminated, the metastatic supuration originating in a primary focus. As a matter of fact, both of these conditions actually coexist.

Clinically, a strict differentiation between these two conditions is impossible from a purely scientific standpoint, as the number and virulence of the microorganisms which find their way into the circulation will at one time give rise to localized metastases and at another to general septicemia. As a matter of fact, transitional forms arise (and these are the most common) and we then refer to septicopyemia or, briefly, "sepsis."

Of great importance for the proper understanding of the clinical condition "sepsis" is the knowledge that in different cases various organs and regions of the body may offer the principal focus for the attack of the bacteria. This gives rise to serious local disease, which naturally stamps the affection

*Read before the annual meeting of the American Otological Society, Atlantic City, New Jersey, June 26, 1911.

with a certain degree of individuality and accounts for the fact that such diseases were formerly regarded as special maladies. While clinically there may be the greatest difference between the septic infection of a cerebral sinus and a so-called malignant endocarditis, pathologically they are both mere manifestations of sepsis with a local point of selection.

As is well recognized, the chronic forms of aural inflammation frequently cause intracranial lesions. A consideration of the pathologic changes wrought by the microorganisms of a chronic discharge enables us to appreciate how these purulent products, through osseous softening and carious erosion, produce intravenous and intracranial complications. Although in the past much stress has been laid on the development of endocranial lesions as a complication of the chronic forms of aural disease, we must not lose sight of the fact that these grave diseases probably arise more frequently from the acute infections than we have formerly suspected. This is especially true in young subjects, due, no doubt, to the fact that the very thin and porous osseous walls offer but an ineffectual barrier to the ingress of infectious microorganisms, thereby actually favoring a primary thrombus of the bulb in the one instance and meningitis in the other.

These infective processes may arise either through the numerous venous connections or by means of their intimate juxtaposition. When arising from the acute form of disease, the infection is carried by means of minute thrombi through the mucosal or osseous veins into the sinus wall, forming a mural thrombus, which may continue to increase in size until the vein is entirely occluded. In the chronic form of aural inflammation an endocranial complication usually arises, primarily from osseous softening and subsequent carious erosion, the result of contiguity. When the sigmoid sinus becomes infected the thrombi may extend, by way of the internal jugular, to the superior vena cava, which was demonstrated in the postmortem findings in one of my cases; or they may involve the cavernous sinus and ophthalmic vein by extension anteriorly through the superior or inferior petrosal sinus, or the thrombi may travel posteriorly to the torcular and superior longitudinal sinus, the resulting septic thrombus being discovered at the autopsy, although the condition was not suspected during the antemortem state.

It is claimed that septic thrombi may be carried to the interior of the brain by the backward motion of the blood current when the lateral sinus is obstructed or obliterated, giving rise to metastatic abscess formations. This may explain the method of infection in three cases of hepatic abscess by aural metastasis, reported by me in 1904. Undoubtedly the back current or regurgitation from an obstructed sinus on one side is capable of producing a similar condition on the opposite side through the torcular.

The clinical symptoms of septic sinus thrombosis indicate that the onset is always sudden; although actual involvement of the sinus itself is a progressive process, usually very gradual even when arising from acute aural disease. This is well illustrated in the report of a case incorporated in this paper. The presence of a sterile clot accounts for the absence of more or less characteristic symptoms in the early stages, but it later becomes septic through bacterial invasion, softens, and disintegrates. However, a septic thrombus may wholly disappear through the process of absorption, resulting in complete obliteration of the sinus, which, through thickening and contraction of the walls, is converted into a hard, fibrous like cord. Such conditions are not infrequently found at autopsies, and would seem to explain or deny the implied theory of their congenital origin.

On the other hand, a septic thrombus, through disintegration, may be converted into free pus and remain inactive so long as both ends are securely sealed by a sterile plug and the vessel wall remains intact. The case herein reported illustrates this point.

Since the memorable operation in 1886 by Barker of London, who successfully evacuated an abscess formation from the temporal lobe, in which case the patient presented no external signs whatever of his malady, we have been laboring, and not in vain, for the betterment of our surgical technic and the development of more accurate methods in brain localization. In the first instance our success has been notable; in the latter, disappointment and chagrin still confront us in a goodly number of cases; and yet, even in brain localization, the greatest problem of medical science today, we can report progress. It seems, therefore, that the dawn of a new era is upon us, and that in the near future we will have mastered this perplexing

problem. The pathology of brain abscess formation is identical with that of sinus thrombosis; their occurrence would no doubt be much more frequent were it not for the obstacles offered by the dura in its resistance to microbic invasion. In this connection we must bear in mind the important fact that the dura will more readily succumb to sudden or accidental infectious exposure than to the usual slow process by carious erosion. In the latter, the firm resistance of the strong fibrous tissue comprising the dura is greatly increased by considerable thickening, and later still further fortified and protected by the formation of granulation tissue.

By means of the blood stream and perivascular sheaths, pathogenic microorganisms are frequently carried to the interior of the skull, causing brain abscess formations, even though there may be no recognizable softening or carious erosion adjacent to the site of local infection in the tegmen antri or tegmen tympani; this etiologic factor is true, also, in the development of phlebitis and sinus thrombosis, but I believe to a much less extent. On the other hand, as a medium of transmission for the production of meningitis and the various metastases throughout the economy, the blood and lymph route is by far the more common.

The following cases, one of sinus thrombosis and the other of brain abscess, are interesting and somewhat illustrative of the few points in pathology mentioned above:

CASE 1. A. D., female, aged 27 years. Admitted to the Germantown Hospital, January 28, 1911. She suffered from severe pain in the right ear for about one week. Claimed never to have had an aural lesion of any description prior to the present illness, and this statement was substantiated by members of her family. Three days prior to admission to the hospital she suddenly developed a Bell's palsy, noticing on awakening in the morning that she could not completely close her right eye nor freely move the right side of her face. At the same time she noticed that her speech was thick.

The patient had an anxious expression, her skin was hot and quite moist, and the pulse soft and rapid. There was no tenderness or other abnormal symptom noted over the mastoid region, and examination of the external auditory canal showed nothing except a mass of detritus. This could be removed only in part, as the slightest manipulation caused considerable pain.

The right side of the neck was swollen from the region of the mastoid almost to the clavicle. This swelling was slightly red, quite tender, and entirely free from fluctuation.

The above mentioned plug of inflammatory debris was removed from the auditory canal on the following day, revealing the destruction of the greater part of the drum head. Temperature on this date was 102.4° and pulse 120.

A mastoid operation was performed on February 3, under general anesthesia. On dividing the periosteum the bone bled freely, there being but little change otherwise in the cortex. After removing the cortex the mastoid cells were found to be soft and necrotic, containing considerable inspissated pus. The tip, however, was not involved, and there was no exposure of the sinus, the osseous covering of which appeared not to have undergone any pathologic changes.

Although I anticipated performing only a simple mastoid operation, the necrotic changes involving the posterior canal were so great that it was necessary to do a complete operation. Assuming that the swelling in the neck represented a Bezold's variety of mastoid disease, a grooved director was introduced into this swelling at the lower angle of the primary incision, but no pus was evacuated. I felt, therefore, that this was an enlarged gland.

With the exception of a rise to 104.2° on February 7th, four days after the operation, the temperature gradually assumed a normal course until February 11, when it began to rise. On February 13 the glandular swelling of the neck had diminished somewhat, but there was still considerable tenderness. The patient appeared quite septic.

On this date Dr. Ross, one of the general surgeons of the hospital, operated on the neck, with a view of removing the enlarged gland. An incision in the line of the swelling revealed a large lymph node over the middle portion of the internal jugular, which proved to be responsible for a considerable part of the edema. During the removal of this node the internal jugular, to which it was firmly adherent, was torn, which was immediately followed by the free escape of considerable pus. After evacuation of this pus the cavity was packed with iodoform gauze, following which the incision was partially closed with silkworm gut sutures.

Ten days later the patient was still running a septic temper-

ature. An X-ray showed a distinct shadow in the region of the lateral sinus. A third operation was deemed advisable, and the retropinnal incision was reopened and the lateral sinus exposed. It was about normal in tension and color, and when opened was found to contain thick, ropy pus. There was practically no bleeding until the sinus had been curetted for a considerable distance toward the trochlea. Water was forced through the jugular foramen from above until it flowed from the wound in the neck. The sinus was packed with iodoform gauze, the incision partially closed, and the wound dressed with sterile gauze.

A bacteriologic examination of the pus showed pure streptococcal infection.

After this operation the patient was pale and the hemoglobin and red blood count low. She was placed on abundant feeding and was given daily a hypodermic injection of one ampoule of "injectio ferri compositus" (citrate of iron, gr.j), under which treatment the hemoglobin and red blood count rapidly increased to approximately normal.

On March 1st the pulse and temperature reached normal.

On March 13th an abscess over the right buttock was opened, containing approximately half a pint of pus. The patient stated that she had had this swelling for three weeks, but did not mention it through fear of necessitating further operative procedures.

On March 23rd, under nitrous oxid anesthesia, Dr. Ross opened the abscess over the right buttock in three places, and inserted rubber drainage. At the same time a slight plastic operation was performed to close the opening back of the right ear.

On March 30th a small abscess about the middle of the outer side of the left hip was evacuated.

The above case is here reported with a view of showing the great destruction that may take place as a complication of an acute aural infection. It seemed so improbable that within a period of about ten days the carious erosion of the mastoid and middle ear should have been so great, together with the Bell's palsy and lateral sinus and jugular thrombosis, with subsequent disintegration of the clot, as well as metastatic abscess formations, that I made every effort to confirm or disprove the statement of the patient and her relatives that her

aural condition was really of the acute variety, and although I was finally compelled to accept their version of the situation, I nevertheless feel somewhat skeptical as to its absolute accuracy. If, however, their statements are true, and of this there seems to be no reasonable doubt, the case is both interesting and instructive to show the rapid destruction and complications arising from this bacterial invasion in an acute aural disease.

CASE 2. I am indebted to Dr. H. A. Rothrock, of West Chester, Pa., for the detailed history of the following case: Patient, Dr. J. R. H., aged 30 years. Family history negative. The patient suffered from most of the usual diseases of childhood, and in addition to these, he had typhoid fever when two years old. About ten years ago he was treated for an acute otitis media, from which he made a prompt and permanent recovery.

On February 25, 1911, he had an attack of "la grippe," but owing to the serious illness of his father, also a physician, he remained in bed but two days, and then attempted to attend to both his own and his father's practice. During this time his temperature ranged as high as 103°. After about three days he became so prostrated that he was again forced to give up work and confine himself to his room. His ear now started to pain him severely, and after two or three days the drum ruptured spontaneously, with a very free discharge. When I first saw him he was still suffering intensely, the discharge was free, of aropy consistency, and light yellow in color. The entire surface of the deep canal was swollen, obstructing a view of the membrana tympani. His temperature at this time was about 102°, and he seemed to be suffering from the great depression that was characteristic of the whole course of his illness, in marked contrast to his usual happy disposition. After thorough cleansing, aristol was insufflated, and this treatment was continued until the time of the first operation. His diet was restricted and a calomel purge given. Under this line of treatment the discharge abated, the funicular appearance of the canal disappeared, and in two or three days the drum was clearly visible, showing a medium sized opening in the lower anterior quadrant. Improvement was gradual but steady for a period of about ten days.

On the afternoon of March 12th his condition suddenly

changed for the worse. The pain again increased and headache set in. During the night he commenced vomiting, of the projectile type. When seen Monday morning, his temperature was ranging around 104° , the pulse rate 90, and respiration about normal. The tongue was heavily coated, and he complained bitterly of pain in the head, mostly frontal, to which location the headache was referred throughout the subsequent course of the disease. There was no bulging of the posterosuperior wall of the canal, no swelling back of the ear, the pressure failed to show any spot of tenderness over the mastoid region. Vomiting continued more or less during the day, and the patient was still irritable and depressed.

About noon he was admitted to the Chester County Hospital, and Dr. S. MacCuen Smith was called in consultation, seeing him about 8 p. m. By this time the posterosuperior wall of the canal was sagging, and deep, hard pressure over the mastoid region elicited some tenderness. Temperature was 104° , pulse rate 90, and respiration 24. Dr. Smith advised and performed a simple mastoid operation. Some granulation tissue and considerable free pus was removed from the lower cells and antrum, securing the establishment of a through-and-through drainage. There was no exposure of either the sinus or dura, the osseous walls covering the same being normal in appearance.

Following the operation the temperature gradually subsided, the discharge decreased considerably in amount, and with the exception of the stitches becoming infected, the course of the disease was apparently normal. However, the patient's mental depression continued, though even in this there was daily improvement. By March 18th his mentality had greatly improved, and the temperature, pulse and respiration had reached normal, which condition remained until the 21st of March.

On the afternoon of this day the temperature rose to 102° , but promptly dropped again with the evacuation of pus from a stitch abscess in the upper angle of the wound. After this the temperature remained about normal until March 25th, when it reached 100° . The next night the patient was seized with violent headache, which lasted with greater or less severity until within a few hours of the second operation. From this time on the prostration and depression increased daily, and for brief intervals the patient would become delirious, being, how-

ever, easily recalled to his surroundings. Mental activity decreased gradually. On the 27th his temperature rose to 100.8° , falling the next day, on which the highest record was 99.4° , and reaching normal again on the 29th of March for a brief period, after which it rose to 100.4° . During this time the pulse and respiration continued about normal.

On March 31st the temperature was nearly normal at midnight, with a pulse of 56. Again it ascended to 101° , around which point it stayed for the next few days. By this time the delirium was becoming more pronounced, although the patient could still talk and think intelligently most of the time. At intervals there was some apparent weakness of the left side, though not as yet sufficiently marked to be at all positive. The pupils were equal, reacted well, and the eyeground, save for some congestion of the retinal veins, was normal. On this day Dr. Smith again saw the patient, in connection with Dr. John H. Gibbon and Dr. George E. Price. By this time pressure symptoms, probably from a brain abscess, seemed to be definitely marked, but in the absence of localizing symptoms it was deemed best to wait a day longer before operating, hoping by that time to gain some definite guide as to accurate localization. On April 1st, left arm and leg paralysis was quite well defined, speech was thick, and the mental condition aggravated. Arrangements were made to perform the complete mastoid operation, with exploration of the brain, on the following day. That night the patient's condition became seriously worse, and by morning he had sunk into a typhoid state, from which he aroused for one or two momentary periods, during which he seemed to recognize those around him. There were constant convulsive movements of the right arm and leg, the left side being apparently paralyzed most of the time, although, strangely enough, on two or three occasions he regained their use, showing his remarkable vitality. At 11 o'clock on Sunday morning, Dr. Smith, assisted by myself and Dr. A. Spencer Kaufman, performed a radical mastoid operation. There was not the slightest evidence of further carious erosion in any part of the mastoid or tympanic cavity. The brain cavity was opened through the tegmen antri. The bulging dura showed abnormal intracranial pressure, though no pathologic change was noticed in the dura itself. On incising the dura, healthy brain matter crowded into the wound.

The Jackson brain forceps were introduced, first upwards, inwards and forwards, then upwards and inwards, and again upwards, inwards and backwards. The third time there was a gush of about one ounce of pus from a cavity located about two inches deep from the dural surface. The lateral sinus had already been exposed and found to be healthy. A drainage tube was introduced into the abscess and the wound packed and dressed.

The next day the patient's mental condition was considerably better, but the temperature was now ranging about 104° , the pulse from 120 to 150 and the respiration had reached 32.

On the following day the patient's condition was less satisfactory, and Dr. Smith removed the tube, which was somewhat occluded. This provided for the free escape of some pentup pus, and resulted in a temporary betterment of the patient's condition. A drainage tube was reinserted in the old tract.

An examination of the pus showed a pure streptococcic infection. In the meantime autogenous vaccines had been administered. A few days later the pus, which was gradually becoming less in quantity, ceased. The tube was removed, but no pus evacuated. Apparently the abscess had been completely drained.

Despite all that was done, however, the patient's condition became steadily worse and he died on April 6th. The temperature taken in the axilla shortly before death was 106.2° , pulse 180, and respiration 60 to 70. An autopsy was refused.

The differential blood count, as made by Dr. Wellington W. Woodward, is interesting, as it well demonstrates not only the severity of the infection, but the patient's great power of resistance. On the day of the first operation he presented a leucocytosis of 12,000, which gradually increased up to the time of the second operation to 15,000, with a polynuclear percentage of 86.5, whereas the day before his death the leucocytosis was 22,600 and the polynuclear percentage 93.1.

From the above history it would seem that a brain abscess formed within two weeks of the time of this patient's initial ear lesion. Although he seemed to improve materially after the simple mastoid operation, yet the mental state was never entirely satisfactory, and I feel, therefore, that the collection of pus within the interior of the skull must have been deposited

through the medium of the blood and lymph streams very early in the course of the disease, and was present or in process of formation at the time of the first operation.

Another point of interest is the fact that I succeeded, apparently, in evacuating the pus from the parent abscess formation. The patient's death, therefore, was probably due to a diffuse meningitis or general encephalitis as a result of ruptured satellite abscesses.

It is also interesting to note that the abscess was situated about two inches beyond the dura, with healthy brain tissue separating these two points.

The refusal of an autopsy denied us the opportunity of ascertaining valuable clinical facts.

XLVII.

THE ETIOLOGY OF OTOSCLEROSIS.

By W. SOHIER BRYANT, A. M., M. D.,

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The great diversity of opinions on the etiology of otosclerosis stands in striking contrast to the almost complete unanimity in regard to the anatomic changes of the otosclerotic foci that occur in the labyrinthine capsule. The present paper is an attempt to classify the various views that have been advanced, in the hope of arriving at a more definite conclusion concerning the etiology of the disease.

It is a well-established fact that the variable lesions of otosclerosis are exact counterparts of variable osteitic lesions occurring in other parts of the skeleton. In all these bone affections the progressive stages of the osteitis are as follows: first, the vascular osteitis of Volkmann, then replacement of the normal bone by osteoid tissue, and finally osteoporosis or rarefaction of the bone. It is generally accepted that these bone changes in the skeleton are due to a variety of causes, both toxic and trophic in character. Among the toxic causes may be mentioned syphilis and infections such as puerperal osteomalacia and infantile rachitis. The trophic causes include similar changes of a trophic nature, as noninfectious osteomalacia associated with alterations in the internal secretions.

A number of authors, without assigning a fundamental cause, have been content to consider otosclerosis a primary disease of the labyrinthine capsule. These authors are Bezold, Brühl and Politzer,⁴ Ed. Hartmann, Kalenda,¹⁴ Jörgen Möller, Siebenmann, and Stein. Politzer goes so far as to say that the disease may occur in perfectly healthy individuals.

Inherited defect has been thought by Wagner to be the cause of otosclerosis. Siebenmann and Manasse, who by the way also consider the lesion a primary disease of the labyrinthine

capsule, have explained the etiology of otosclerosis on an embryonic basis. They believe it to be due to an atypical development of embryonic cartilage, the new spongy bone being formed at the expense of the remnants of the primary cartilage in the capsule.

Politzer,²⁰ Jörgen Möller, and Lindt consider that they are justified in their assumption that otosclerosis is primary in the labyrinthine capsule on the basis of their observations upon otosclerotic lesions which they found separated from the perosteum by normal bone. This finding is in startling conformity with observations concerning osteomalacic lesions: in the latter normal bone is often found separating the osteitic foci from the periosteum.

According to other authorities, otosclerosis originates in the middle ear and is a secondary disease of the labyrinthine capsule. Among them are Bezold and Scheibe, Habermann, Katz, Lucae,¹⁸ Manasse, Schilling,²³ and formerly Politzer, whose present definition of otosclerosis, however, requires that the disease shall be primary in the labyrinthine capsule. In corroboration of this view of origin in the middle ear, Gradenigo and Leland¹⁷ state that the treatment of catarrhal inflammations in childhood—which lead to otitis media—prevents the development of otosclerosis in adult life. Habermann,¹² Hammer-schlag and Katz think that otosclerosis originates in the perosteum of the middle ear.

Some authors—Manasse, Jörgen Möller, Lindt, and Katz¹⁵—have found otosclerotic foci at the internal auditory meatus. This view justifies, in part at least, the opinion of Denker, Habermann of Breslau, Hegener, Katz, and Scheibe, that otosclerosis originates in the internal periosteum or dura mater.

Trophic and toxic conditions have also been named as being causative of otosclerosis. There appears to be good evidence that the disease may be the result of interferences with general nutrition, as believed by Heiman.¹³ Tweedie²⁶ and Walb²⁷ consider it the result of changes in the blood and circulation, and as due to general infections. Yearsley²⁹ considers anemia and chlorosis important causes of otosclerosis. Toynbee, Körner, Yearsley,²⁹ and Lucae assign gout as the chief cause. Lafitte-Dupont and Manfetil are of the opinion that otosclerosis is a complication of high blood tension and arteriosclerosis.

Menstrual irregularities, pregnancy, and childbirth have been advanced by Sewell²⁵ as the chief causes of otosclerosis.

Politzer,²⁰ also, originally believed otosclerosis to be an infectious osteitis, originating in pregnancy. Milligan concurs in this view. Hanau states that the temporal bone is altered in pregnancy, at the same time when other parts of the skeleton are affected. Yearsley and Cornet⁶ think that the intoxication of pregnancy is an important cause.

An inflammatory origin is assigned by Katz as the cause of the disease, and Heiman¹³ and Grunert¹¹ believe it to be due to a specific inflammation. Certain authors—Hammerschlag and Mannasse—consider otosclerosis a chronic osteitis of the temporal bone. Various etiologic causes have been advanced for this chronic osteitis.

Ferreri¹⁰ states that otosclerosis is an infectious disease, identical with osteomalacia and rachitis, and he believes that this identity of origin explains certain hereditary cases of otosclerosis.

Many authors, including Virchow, Volkmann, Habermann,¹² Körner, Sewell,²⁵ Gradenigo, Grunert,¹¹ Baginsky,² Yearsley,²⁰ Pommer, and Brisch³ together with Blumenthal and Hoffmann, consider syphilis the chief cause of otosclerosis. Chronic toxemia, especially gastrointestinal toxemia, is assigned as the cause by Escat⁸ and Cornet.⁶ The latter writer^{6,7} believes that otosclerosis is due to general infection, chiefly traceable to autointoxication. He also names renal and hepatic insufficiency as causative factors.

Gray, followed by Sewell²⁵ and Yearsley,²⁰ considers otosclerosis due to the thrombosis of the vessels of the bone and death of the bone, resulting from causes favoring local thrombosis.

Schmiegelow²⁴ maintains that trophic disturbances are the cause of otosclerosis. Alexander,¹ on finding otosclerosis present in cretins, declared that the affection may follow changes of internal secretion.

Of late considerable emphasis has been laid on the association of otosclerotic changes with degeneration of the auditory nerve and with paresis of the sensory supply of the external meatus. According to Tweedie²⁶ and Walb,²⁷ otosclerosis is primarily an affection of the nervous system; Cornet⁸ and Manasse¹⁰ also believe the disease to be due to nerve lesions. This view of a nervous origin was advanced as far back as 1884, when Woakes²⁸ expressed the opinion that changes in the ear, which according to his description resembled otosclerosis, were of vasomotor origin and were due to a defect in the sympathetic

nerves and the cervical ganglia. He believed that these defects unfavorably influenced the region—including the ear—of which the cervical ganglia are the trophic centers. Woakes claimed that the nerve disturbances could be traced to hereditary defect or predisposition.

It is unfortunate that a suitable designation has not as yet been found for the lesion under discussion. Notwithstanding the high authoritative backing of its nomenclature, other terms which, according to the views of various authors, would be more fitting, have been put forward from time to time, and especially of late. Manasse,¹⁹ for instance, favors the use of the term "osteomalacia," because, as he says, the principal characteristic is chronic inflammation of the bone. On this point my own views agree with those of Manasse. I believe, however, that it is desirable to qualify the word, making it more definite; and I therefore suggest as a term certainly more appropriate than the one now in use, the designation "labyrinthine osteomalacia."

Having thus passed in review the various theories, practical and theoretical, advanced by these forty-five authors, the writer desires to add his own conclusions on the subject. Without entering into further discussion of the causes that have been enumerated, I believe that the origin of otosclerosis is various—just as similar osteitic changes occurring in other parts of the skeleton may be attributed to a variety of causes. The result of all bone irritation must be the same, for the structure of the bone is such that whatever the irritant, no other change could take place in chronic nonsuppurative inflammation. Many authors have attributed trophic and toxic disturbances as etiologic factors of otosclerosis. I coincide in this view and believe that these trophic disturbances are due to altered internal secretion, chiefly of the thyroid gland. It is my opinion that in many cases the trophic disturbance affects the otosclerotic foci only indirectly, acting, as suggested by Woakes, through the medium of the sympathetic or trophic nerves. I am in entire agreement also with Gradenigo and Leland, that otosclerosis may be prevented in adults if the catarrhal infections of childhood are treated properly, for the principal cause of otosclerosis is chronic infection of the upper air tract. In adult life, as well as in childhood, the condition of the nasopharynx has a most important etiologic bearing upon otosclerotic changes.

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XLVIII.

A CASE OF RAREFYING OSTEITIS OF THE
MASTOID BONE.*

BY CHARLES W. RICHARDSON, M. D.

WASHINGTON.

I present this case of rarefying osteitis of the mastoid bone partly on account of its rarity and partly on account of the fact that this is a unique case in otologic practice, and on account of the rarity of this type of bone inflammation as affecting the flat bones.

On October 21, 1910, a man of 32 years came under my care with the following history: In January, 1910, he developed an acute inflammation in the right middle ear, which subsided after running the usual course. There was a moderate degree of mastoid tenderness, which did not abate with the cessation of the middle ear inflammation. This mastoid tenderness, which was intermittent at first, towards the end of February became continuous, with exacerbations of intense suffering at night. In March he developed what was stated to be an abscess in the canal, which was incised on two separate occasions. There was no relief afforded the patient to the mastoid suffering by the opening of the abscesses in the canal wall; the mastoid pain became more intense with each succeeding month, until the patient was nearly exhausted from pain and loss of sleep, when he came under my observation. The patient states that, while the pain was most intense in the mastoid region, it radiated from this region all over the head. He also stated that large knots formed on his head at night, which would subside during the day.

I must confess that, after listening to the patient's history and his description of his intense suffering, I felt quite skeptical as to its truthfulness. During the greater portion of this period he had been under the observation of several aurists.

*Read before the American Otological Society, Atlantic City, New Jersey, June 26, 1911.

On examination of the patient I found that I had erred in my opinion. There was a slight infiltration of the soft tissue over the mastoid. The auditory canal and the membrana tympani were normal, the whole mastoid region was exquisitely tender—more so that I had ever observed in any patient before—and the slightest touch with the finger would cause him to cry with pain. This tenderness was limited entirely to the mastoid. The patient would permit considerable pressure beyond the confines of the mastoid without any evidence of suffering. A blood count was made the same day, showing 9,300



white cells with a practically normal differential. The patient's temperature taken at this time was 99° ; when taken at the hospital the following morning, it was found to be normal.

I was uncertain as to the nature of the condition which here presented itself, but, feeling that relief was demanded, I decided upon doing an exploratory operation the next day.

The usual operative procedure was adopted as in doing the ordinary mastoid. After incising the infiltrated soft tissues and raising the periosteum, during which a few drops of pus were seen, the exposed bone over the mastoid presented two

peculiar phases, viz., it was of a pinkish color and imparted a decidedly rough sensation to the examining finger. This area of discolored bone also seemed to be slightly raised above the surface of the adjoining healthy bone. The area of diseased bone was chiseled away in every direction and as far inward as the inner table of the bone. It was not deemed necessary to open into the antrum mastoideum. Various chipings and large pieces of bone were saved for microscopic examination. The patient never had a particle of pain after coming out of the anesthetic and made an uninterrupted and rapid recovery.

The pathologist of Providence Hospital, Dr. R. A. Hamilton, made the following report on the specimens of bone placed in his hands:

"Macroscopic examination of specimen. The bone is redder and much softer than normal, some of the pieces being easily fractured by pressure of the fingers.

"Microscopic examination (after decalcification) shows increased production of connective tissue and round cell infiltration, the character and morphology of the cells excluding malignancy. In some of the sections there are areas where the bone is undergoing absorption, and, in others, there seems to be a direct formation of new bone. The microscopic picture is one commonly met with in rarefying osteitis."

XLIX.

BLOOD CULTURES IN OTOLOGY.*

By FREDERIC E. SONDERN, M. D.,

NEW YORK.

The relative frequency of instances is noteworthy in which the positive or negative result of a blood culture is of distinct diagnostic value to the otologist. The comparatively few published accounts of its use would seem to indicate that this valuable diagnostic aid has not had the general attention in the routine practice of the specialist it deserves.

Emanuel Libman of the Mt. Sinai Hospital is certainly entitled to the credit of having done much original work in blood culture studies in diseases of the ear, and his pioneer publications on this subject are both interesting and instructive. The attempt to base positive and unexceptionable rules solely on the outcome of this procedure is an error, just as in any other laboratory aid, and it is this effort that has led to controversy and more or less discredit. The object of this communication is to rehearse briefly the value found in positive as well as negative blood cultures in otologic practice and to demonstrate the relative ease of the technic.

In cases of acute purulent otitis media without or with mastoid involvement, bacteria are not usually found in the blood cultures. There are exceptions, however, and these cannot always be ascribed to errors in technic, as they have occurred in the experience of numerous competent clinicians and accurate laboratory workers. It also does not seem justified to claim that an unrecognized thrombosis exists in these exceptional cases. Fortunately these exceptions are rare, particularly after efficient surgical treatment of the middle ear and mastoid.

In the cases in which there is a thrombosis of the sinus, bulb or vein, bacteria are found in the blood cultures in a

*Read before the American Otological Society, Atlantic City, New Jersey, June 26, 1911.

very large percentage of the cases. Exceptions to this rule also occur. A thrombus is quite firm at first, and if it contains but few organisms those may be killed by the bactericidal power of the blood itself. Even if infected to a greater extent, the firm clot may prevent the organisms from getting into the blood current. It is even possible that pieces of infected clot may break off and be carried by the blood to distant parts, causing metastatic suppurating foci without bacterial infection of the blood stream itself. In the large majority of instances, however, the softening of the thrombus causes bacteria to be fed to the blood stream in increasing numbers, and then positive blood cultures are invariably obtained. Not only an extension of the infection to the sinus with a resulting thrombosis will produce a bacterial infection of the blood current, but a secondary meningitis, a brain abscess or even an extradural suppurative focus may subsequently do the same. It is also very important to remember that these general invasions of the blood current may result from local processes other than in the ear, and the mere fact that a bacterial infection of the blood stream is found naturally does not necessarily indicate otitic origin.

In a given case of acute suppuration of the middle ear with mastoid involvement, a positive blood culture should not be accepted alone as certain evidence of a coexisting thrombosis of the sinus. It has been demonstrated, as previously stated, that exceptionally a bacteremia does occur without a thrombosis of the sinus, but this is certainly unusual, to say the least. After proper surgical treatment of the middle ear and mastoid in these exceptional cases, the bacteremia should decrease and disappear together with the proper behavior of the condition clinically. On the other hand, should the colonies increase in number in the subsequent cultures, it may be accepted as strong presumptive evidence that an extension of the invasion has occurred. The most frequent extension is into the sinus with resulting thrombosis, and for this reason the bacteremia is usually quite properly looked upon as one of the evidences that such extension has occurred. In the great majority of instances, however, a bacterial invasion of the blood current does not occur in the cases of middle ear and mastoid infection unless there has been an extension into the sinus or elsewhere.

While the presence and particularly an increasing degree of bacteremia may justly be accepted as an indication of such extension, the clinical evidences are imperative to determine what structures have been invaded. It is self-understood that the direct invasion of the circulatory apparatus will lead to positive blood cultures far more easily than an invasion of the meninges or brain tissue, and subsequent infection of the blood stream, but, after all, the clinical symptoms and not the blood culture must determine the nature of this extension. An extension of the process beyond the mastoid may occur and still may not give rise to a bacteremia for the reasons previously stated, namely, a firm clot with a small or large number of organisms may not cause infection of the blood current until softening of the thrombus occurs. For this very reason it is evident that a single culture, if negative, may be misleading. When suggestive symptoms occur, a negative blood culture may be used as an argument against sinus thrombosis possibly for the moment, but if these symptoms continue, repeated cultures are necessary, as the former negative culture can have no weight whatever.

It is natural that intercurrent diseases or complications of the original causative disease, with consequent elevation of temperature, may occur during the course of an otitic infection. The blood culture aids in the differential diagnosis, though careful clinical observation with indicated laboratory aids, are at least equally important and sometimes more so. Acute articular rheumatism shows a negative blood culture, while a pyemic joint is usually associated with a bacteremia. Pneumonia usually gives physical signs and possibly a bacteremia of other type than the otitic infection. Typhoid shows a leucopenia and relative lymphocytosis, and possibly characteristic organisms on blood culture or a positive Widal reaction, while an extension of the otitic infection shows a leucocytosis and relative polynucleosis and possibly a positive blood culture of the organism found in the ear. Tuberculosis also shows a leucopenia and relative lymphocytosis and even a positive Diazo reaction at times, but the blood cultures are sterile, and a von Pirquet or Calmette may be positive. Unusual temperatures and disturbing symptoms, such as headache and local neuralgia, due to an unrecognized acute nephritis, may develop during the convalescence of a scarlet fever mastoid.

If perchance a streptococcemia exists, which is not unknown in this disease, an erroneous diagnosis of sinus thrombosis would easily be made, if the rule is accepted that a bacteremia invariably indicates this complication.

The following conclusions seem justified: Early positive blood cultures with an unopened mastoid infection usually indicate coexisting sinus thrombosis. The possible exception must be kept in mind, especially in absence of all clinical signs. Negative blood cultures under like conditions usually allow the exclusion of a sinus thrombosis. The possible exception must be remembered, especially if suspicious clinical signs exist.

Late positive blood cultures in operated cases of mastoiditis with exacerbations of temperature after a longer or shorter afebrile period, also usually indicate thrombosis. But it is in these cases that particular care must be exercised in concluding that the infection of the blood stream is due to a thrombosis and not to a meningitis or brain abscess, to say nothing of a more distant point of invasion not necessarily secondary to the mastoid suppuration. Negative blood cultures under like conditions usually allow exclusion of a thrombosis and indicate careful search for other causes to explain the temperature curve; but the exceptions to this rule must not be forgotten.

With reference to the organisms found, the streptococcus is without doubt the most frequent invader of the mastoid and deeper structures, and in consequence is the organism most frequently obtained in blood cultures. The streptococcus mucosus and the staphylococcus occur next in the order of frequency. While most of us have not seen a sinus thrombosis follow a pneumococcus infection of the ear, the evidence is not yet nearly sufficient to justify a conclusion that it does not occur. With due regard to the difficulty in differentiating streptococci and pneumococci, and admitting the inability to do so in some instances, there does seem sufficient evidence at hand to believe that the pneumococcus does act as a pyogenic organism in the mastoid, and consequently it seems difficult to understand that it cannot produce a sinus thrombosis as well.

It is certainly true that the staphylococcus and pneumococcus found in otitis media are far less apt to cause mastoid

and deeper seated complications than the streptococcus and streptococcus mucosus, but absolute rules should not be made concerning the relative virulence of one organism as compared with another, or that certain structures are immune to certain bacterial invasions. More searching investigations of the bacteria concerned in the production of the suppurative processes under consideration may teach much of value, for the anaerobic organisms present have had but little attention as yet.

Blood culture work in this as in other fields should be done quantitatively, that is, not only the organism should be determined, but the number of colonies per cubic centimeter should be estimated. This is of particular value when cultures are repeated, as a decrease or an increase in the bacteremia is thus learned. If the organisms present produce hemolysis is a point which should also be carefully observed, as it invariably indicates a more serious condition than when this solution does not occur.

Blood cultures should when possible be made by those thoroughly familiar with the laboratory technic, as the distribution of the blood in the different media must be done before coagulation occurs, and to do this accurately and quickly with blood at the point of coagulation requires dexterity only acquired by practice.

A suitable vein, if possible at the bend of the elbow, is selected and a constricting bandage is applied above. The region is thoroughly cleansed with green soap, ether and alcohol, and a drop of tincture of iodine allowed to dry where the puncture is to be made. If a properly sterilized 10 cc. all glass syringe with fine iridoplatinum needle is used in place of the 25 cc. hospital affair with a trocar-like weapon attached, the patient usually makes no objection whatever to the original or repeated aspiration. Having obtained from 5 to 10 cc. of blood, an assistant or nurse removes the bandage, holds the arm up for a few minutes and applies a drop of collodion over the puncture. The obtained specimen is quickly and accurately distributed in the different media, namely, flasks of plain bouillon and glucose bouillon, and plates of glucose agar, serum agar and glucose serum agar. These are incubated at 37.5° C. and examined at eighteen hour intervals. The rapidity of growth varies decidedly with the same type of organism,

and prolonged observation is essential before the culture can be considered sterile.

The difficulty of transporting the various culture media to the bedside in private practice and the danger of partial coagulation before the blood has been accurately distributed, induced Epstein (*American Journal of Medical Sciences*, September, 1907) to suggest the use of a method to prevent the coagulation of the blood and thus allow the distribution to be made at leisure in the laboratory.

A large tube containing 10 cc. of an isotonic ammonium oxalate solution, the whole properly sterilized, is carried to the bedside, into which the aspirated blood is immediately introduced and a complete mixture made. This specimen can then be accurately distributed in the various media at the laboratory. Ryttenberg (*Journal of Medical Research*, XX, No. 1) has demonstrated the comparative value of this method, and a limited experience with it tends to corroborate his results. Another advantage it has is that it can be put into the hands of the surgeon for the purpose of obtaining the specimen which is subsequently handled by the laboratory worker.

I.

SUPERNUMERARY AURICLE ASSOCIATED WITH
CHRONIC SUPPURATIVE OTITIS MEDIA.*

BY HAROLD HAYS, A. M., M. D.,

NEW YORK.

Among the less common congenital conditions with which one comes in contact are the so-called auricular appendages or supernumerary auricles. In the ear clinics of this city, perhaps one or two noticeable cases are seen in a single year.

The auricular appendage is commonly classed among the fibromata. The fact is that it is composed of the same elements as the rest of the auricle and is but an excessive epithelial growth from the first branchial cleft. As a rule, they form pedunculated tumors in contiguity with the tragus. Only one may be present or as many as six or eight. Often-times the tragus itself is larger than the corresponding one of the opposite side. According to Virchow, these tumors consist of reticular cartilage, subcutaneous cellular tissue and skin. Although they are usually connected to the tragus, they may spring from the lobule, the shoulder or the side of the neck. Warner claims that such a congenital defect is usually associated with some other congenital anomaly. Out of 50,000 school children examined by him, only thirty-three were found with supernumerary auricles. This percentage is perhaps justifiable, if one includes many of the fibrous excrescences occurring on the auricle or tragus. Reverdin claims that a congenital anomaly may be present in some other member or members of the family, as in the case of a man who had a supernumerary nipple on the right side of the chest. Three of his five children had preauricular appendages.

The patient whose stereoscopic picture is here presented came to the New York Eye and Ear Infirmary about November 1, 1910, complaining of profuse discharge from the right

*Presented before the Hunterian Medical Society, December, 1910.

ear. Examination showed a large supernumerary auricle, about $1\frac{1}{4}$ cm. long and $\frac{1}{2}$ cm. in length and breadth. The tragus was very large, at first glance looking like a second appendage. An eczematous condition of these parts and of the auricle and the canal had arisen from the profuse discharge. Examination of the drum was very difficult on account of the inflammation in the canal. The patient informed me that two more appendages had been removed in childhood



and that she knew another woman in her home country in Europe who had eight of them. Her children were free from such a condition and, as far as I could ascertain, she had no other congenital defect.

The photograph must be looked at stereoscopically to get any idea of how far out from the ear these tumors stand. I am indebted to Dr. George S. Dixon for his kindness in making the picture.

11 West 81st Street.

LI.

CASE REPORT OF EXTIRPATION OF THE LARYNX.*

By ROBERT H. CRAIG, M. D.,

MONTREAL.

The patient, R. W., age 65 years, male, was referred by Dr. Robert Wilson to the laryngologic clinic of the Montreal General Hospital in June, 1907. He complained of a husky voice which he first noticed about March of the same year and which had been gradually increasing. Dr. Wilson at the time suspected commencing malignant disease and suggested to Dr. Hamilton the advisability of direct application of radium to the larynx. Examination at the time revealed fixation of the right half of the larynx with considerable thickening of the right vocal cord and the interarytenoid region, and commencing infiltration of the arytenoid cartilage. There was also a superficial ulceration of the middle third of the right vocal cord, but no limitation of movement. A small piece of the infiltrated area was removed and examination showed a chronic inflammatory growth.

The patient was placed upon antisyphilitic treatment for a period of one month without influencing the growth or character of the voice; then 5 milligrammes of pure radium sulphate were applied (2,000,000 activity) for ten minutes three times a week for a period of three months, also two applications a week of a high vacuum Liffard X-ray tube applied on either side of the larynx, with a screen of one-fourth inch sole leather actuated by a 64 plate static machine passing one-half milliamperes through the tube; length of treatment 12 minutes. As no apparent benefit was derived, the patient, unwilling to consent to operation, left the clinic. He states that he was able to work for about a year. I shall here use the patient's own

*Read before the American Laryngological, Rhinological and Otolological Society, Boston, February 16, 1911.

words in describing what occurred after he left the Montreal General Hospital Clinic:

"I resumed my occupation again and worked for nearly a year, during which time my throat continued to give great concern as it did not show any signs of getting better, but, on the contrary, became much worse and affected me so that I could not sleep. I lost strength, my appetite was so impaired that at last I found myself choking to death. I could bear it no longer, and consulting Dr. Robert Wilson on July 6th, he arranged for me to enter the Western Hospital on July 10th."

Upon admission he complained of sore throat, difficulty in breathing, loss of voice, and cough. I was requested to examine his larynx, and was surprised to see our old patient. Examination at this time revealed a fairly well nourished man lying in bed with head elevated, considerable cyanosis of the lips, marked inspiratory stridor, and indrawing of supra-sternal and supraclavicular fossæ with each inspiration. Breath very foul, thorax well formed, lungs negative, pulse decidedly accelerated, no marked glandular enlargement or tenderness. Examination of his larynx showed complete immobility and infiltration and ulceration of the right side. There was almost complete immobility of the left half, with infiltration and ulceration of the vocal cord, ventricular band and arytenoid cartilage.

I did a low tracheotomy under cocaine, and as the patient obtained decided relief, he and his friends urged a radical operation. I was rather diffident about complying with their request, on account of the extensive involvement and the age of the patient. However, on August 2nd, as he had gained considerable strength, with the able assistance of Dr. Springle, I completely removed the larynx after Gluck's method, and several enlarged glands on either side. Unfortunately ten days after the operation a fistula formed which, after several attempts, I succeeded in closing. Pathologic examination by Dr. Nichols showed the growth to be of an epitheliomatous nature. The patient in his report states that he was in perfect health after leaving the hospital except for the loss of his voice. Unfortunately seven months later he developed a left sided hemiplegia which necessitated his return to the hospital, from which he has made a fair recovery.

There are several interesting features in this case apart from

the main fact of his recovery: First, the result of the application of radium. Even the infinitesimal quantity in which it was applied possibly retarded the development of the growth and assisted in preventing the formation of metastases. Second, the patient's wonderful courage and determination to live. Third, the fact that he can make himself understood without any artificial appliance.

The operation of extirpation of the larynx is a most formidable one and its gravity is such that every means possible should be resorted to before adopting such a radical procedure. In the treatment of these cases, in the future when an early diagnosis has been made, I feel that it may be wise to employ Nagelschmidt's method of diathermy, viz., a small electrode is applied to the affected area through a Killian or Jackson laryngeal speculum, the indifferent electrode is applied opposite outside. One to three seconds suffice to effectually cook the pathologic tissues. Edema has never occurred in Nagelschmidt's experience.

The fulguration spark might also be successfully applied in these cases. According to my friend Dr. Robert Wilson, one of the leading radiotherapeutists of Canada, diathermy is a more powerful and penetrating agent than the fulguration spark. I shall here read you an extract from a letter that Dr. Robert Wilson wrote to me regarding a recent experience in London:

He says: "I heard Nagelschmidt give an address before the physical section of the Royal Society of Medicine in London recently, at their rooms in Cavendish Square, illustrated by slides of cases and demonstrating the use of his apparatus, which he has designed especially to give such currents. There is no question of the heat producing properties of such a current: the experiment of cooking the white of egg in the path of the current, while leaving the surrounding albumen unaffected was conclusive. The part that interests you is that he has used this current in tuberculosis of the cords, as well as in cancer, and quoted cases: the important point being that he has never had edema of the glottis following its use. He gives the treatment in his office, and in half an hour lets the patient go home. It seems to me, therefore, an unnecessary thing to do a tracheotomy or a thyrotomy, because one can reach the seat of trouble most easily with the direct method, while the

short distance between the inside of the larynx and the outside of the neck materially lessens the length of time of duration of flow of current—two to three seconds being quite enough. As to the apparatus for diathermy, it is practically a step-up transformer discharging through condensers of suitable capacity into an inductance and spark-gap, the whole so balanced as to give a current of great frequency and potential energy, and capable of being transformed into heat in its passage through the body."

Personally I consider diathermy and the fulguration spark to be effectual must be applied in the early stages of the disease. If this is done its future development holds promise of great service in the treatment of these cases. From all I can learn it appears that radium, if used, should be applied in large quantities and properly screened.

To sum up as to the treatment. In an early case where the disease is limited to one side, one could employ diathermy as described. If the glottis is much involved, a preliminary tracheotomy and thyrotomy is indicated and treatment carried out through the incision. If no improvement is observed in four to six weeks, a radical operation is unavoidable.

LII.

SIX CASES OF ACUTE SUPPURATIVE OTITIS MEDIA IN ONE FAMILY WITH REMARKS ON THE COMPLICATIONS.*

By HAROLD HAYS, A.M., M. D.,

NEW YORK.

I desire to present these six cases for your consideration because I believe that it is unusual to find so many persons in one family afflicted with the same trouble within a period of three months. Of these six cases, four of them had symptoms of acute mastoiditis and one of them was operated upon. All of them fully recovered, and in every one of them the hearing is now fully restored.

CASE 1.—This case was reported in the *New York Medical Journal*, March 4, 1911. Mr. A. H., was taken with a severe epistaxis the latter part of November, for which he was removed to the New York Eye and Ear Infirmary. The bleeding continued for twelve hours in spite of the most vigorous local and general treatment. The hemorrhage was so severe that he bled out of his left nasal duct and into the right ear, which was discovered on the fifth day when the patient began to complain of pain in this ear. For the first three days the temperature had risen to 103° and on the fifth day rose to 104.8° . There was quite a little tenderness over the tip of the mastoid, and examination of the drum showed considerable bulging, as if from a mass of blood in the middle ear. As the pain increased on the following day and the temperature again rose to 104° , a paracentesis was performed, allowing of the discharge of a considerable amount of clotted blood. The patient was greatly relieved, the temperature subsided and the mastoid tenderness disappeared. The organism causing the discharge was the pneumococcus. The patient left the hospital

*Read before the Section on Otology, New York Academy of Medicine, April, 1911.

on the tenth day. The right ear was still discharging profusely and there was no hearing in that ear. On the following day, acute pain developed in the left ear and a perforation occurred a few hours later. He lost his hearing in that ear also. In the course of three weeks both ears stopped discharging, and at the present time his hearing is in excellent condition.

CASE 2.—In the early part of January, the wife of A. H., who was in the eighth month of pregnancy, developed an acute influenza. About eight days later, she was suddenly seized with a very severe pain in her left ear. Examination of the ear showed a marked bulging of the drum. The temperature was 100 per rectum. Irrigations were ordered for twelve hours, after which time a paracentesis was performed, allowing of the discharge of a serous fluid. Severe mastoid tenderness had developed, extending to the tip and to the postmastoid cells. Although there was no question of an acute process in the mastoid, on account of the patient being in the later months of pregnancy and because the process was of such short duration, it was decided to keep the patient under observation a few days longer. However the patient's condition became steadily worse, so that after another thirty-six hours it was decided to perform another paracentesis. After due consultation with Dr. Robert Lewis, I came to the conclusion that if the patient did not improve in another twenty-four hours, the mastoid would have to be opened. As no improvement did take place, a mastoidectomy was performed. The cortex of the mastoid was very hard, but as the deeper cells were reached, pus and granulation tissue were found. Posterior to the sinus was a cell as large as the tip of the little finger, filled with diseased tissue. This communicated by a small column along the inferior edge of the sinus plate, then along the anterior edge into the antrum. The mastoid was thoroughly exenterated, a wick of gauze inserted into the antrum and allowed to extend out from the lowermost portion of the wound and the wound sutured all except the lowermost angle. A dry dressing was applied.

For the first three days the patient did beautifully; but on the fourth day, the temperature rose and it was seen that an erysipelas of the face had developed (left). The area of the mastoid was not infected. The erysipelas spread gradually over the bridge of the nose to the right side. The patient's temperature was never over 102° and only one night was she

delirious. On the eighth day the erysipelas disappeared and two days later the patient returned to her home. Of course during this time no more than the most necessary attention was paid to the mastoid wound and as a consequence the healing was slightly delayed. However, by the end of three weeks, the ear and wound were perfectly clean.

I might mention that on the day she was taken to the hospital an abscess developed in the other ear and at the time of the mastoid operation, a paracentesis was performed on this ear. The discharge from this ear continued for some six weeks.

About four weeks after the operation the patient was delivered of a baby boy with great difficulty. There was considerable laceration of the perineum, which was sutured at the time, after a labor lasting for four days. The day following the delivery the patient was in excellent condition; but for no apparent reason, on the next day the temperature rose to 105° . Although the delivery had been perfectly clean, a vaginal inspection was made. Neither the lochia nor the examination revealed any cause for the fever. There was some distension of the abdomen which was relieved by catharsis. The following day the temperature was still 105° and the patient began to complain of severe headache and occipital pain, particularly on the operated side, and that evening the lower angle of the wound opened and a small amount of discharge took place. On the following day some edema was felt posterior to the mastoid wound. I therefore decided to make an opening about three-quarters of an inch behind the mastoid wound and establish communication between the two. Gauze drainage was instituted and on the following day the temperature dropped to normal.

For the following two weeks the patient ran an intermittent temperature from normal to 105° every other day. She still complained of terrific headaches, but there was absolutely nothing in the mastoid region to indicate any trouble. It appeared that there might possibly be a sinus thrombosis or brain abscess. An examination of the eyegrounds was negative. I determined at this point to have a thorough examination of the blood made by Dr. George S. Dixon. His report was as follows: Blood culture, negative; red blood cells, 3,580,000; white blood cells, 24,800. The polynuclears were 83 per cent of the total differential count. There were no malarial organisms. Widal and

Ehrlich tests were negative. Of course, such a blood picture showed evidences of a pus infection somewhere; but although a most painstaking examination of the entire body was made, nothing of any import could be found. Strange to say, the day following the blood culture, the temperature fell to normal and the patient was absolutely well for five days. On the sixth day the temperature again arose to 105° , there was considerable frontal headache and a purulosanguinous discharge from the nose. Frontal sinusitis was evident and appropriate treatment instituted. From that time on the patient began to improve rapidly, and up to the present time, two months later, is in excellent health. What had caused her febrile condition no one can say definitely.

CASE 3.—On the day before Mrs. W. was operated, I telephoned to her brother, a doctor practicing up in New Hampshire. On his way down here to New York he suddenly developed a terrific pain in his left ear. On his arrival his temperature was 102° . Examination showed both ear canals filled with cerumen. On removing this, a deeply inflamed bulging ear drum was seen on the left side. I performed a paracentesis under gas anesthesia that same night. He made an uneventful recovery in a short time.

CASE 4.—A sister came down with her brother, the doctor. Two weeks after her arrival she developed an acute influenza, and on the second day of her illness she complained of severe pain in her right ear. The ear drum was found to be bulging and deeply injected. Twenty-four hours later it was necessary to incise the drum. The discharge was serous in character and extremely profuse. For the next few days she ran a remittent temperature, at times as high as 104° . The entire mastoid region was extremely tender, but the patient's general condition remained good, and therefore I decided to try expectant treatment. At the end of a week the mastoid tenderness disappeared entirely, but the discharge from the ear had become purulent in character and was still very profuse. Under repeated irrigations with Dr. Fowler's ear douche and the instillation of drops of boric acid and alcohol, the discharge became much less. She left the city before she was entirely well, but I heard subsequently that she had no more trouble with her ear.

CASE 5.—The mother-in-law of this sister, 53 years of age, had been in the city since the latter part of December and was

perfectly well. She developed an influenza the latter part of February and an acute inflammatory condition in the right ear. At first she refused any treatment and a perforation developed spontaneously. There was a profuse discharge of a mucopurulent material. The pain, however, did not subside, and she developed all the typical signs of acute mastoiditis. The mastoid tenderness was so extreme that many a time I was on the point of telling her she would have to go to the hospital to be operated, but she had such a horror of an operation that I continued to treat her expectantly. As the drainage was not sufficient, I finally prevailed upon her to have a paracentesis performed. She had become totally deaf in that ear. Her temperature had run remittently up to 102° . Under proper office and home treatment the discharge ceased entirely and today she is perfectly well.

CASE 6.—As I stated before, the baby was born about the middle of February. Although weighing only five and one-half pounds at birth, it thrived very well. But at the end of four weeks it cried all one night, and the following morning the mother noticed a discharge of pus from the left ear. The child ran a very slight temperature. The ear was kept clean and at the end of the week the discharge had ceased.

It is rather unusual to find six members of one family suffering from an acute middle ear infection. The disease seemed to be passed on from one to the other and did not develop simultaneously in all. Although four cases showed symptoms of mastoid disease, it was necessary to operate for mastoiditis in one case only, showing that conservative treatment pays. I am sorry that cultures were not made of the ear discharges except in the first case. I believe that the cases of both the doctor and the child were mere coincidences. Cases 2, 4 and 5 may possibly have been infected one from the other. I have been able to keep track of the family, and am glad to say that in every instance the patient is at present in excellent health.

11 West 81st Street.

LIII.

MUCOCELE OF THE NASAL ACCESSORY SINUSES—
REPORT OF THREE CASES (ETHMOID, MAX-
ILLARY ANTRUM, FRONTAL), WITH TAB-
ULATION OF THIRTY-SEVEN CASES.*

By HILL HASTINGS, M. D.,

LOS ANGELES.

These cases of mucocele of the nasal accessory sinuses are reported largely because of the negative nasal findings and the marked facial deformity in each case. One patient was referred on account of exophthalmos from an orbital growth, suspected to be sarcoma. The second was referred on account of swelling of the cheek and marked displacement of the teeth, believed to be due either to a sarcoma or antrum supuration. The third case was referred on account of a "tumor" of the frontal region. In no case were there any nasal symptoms.

MUCOCELE OF THE ETHMOID.

CASE 1.—F. A. R., male, resident of Texas, age 30, was referred October 30, 1908, by Dr. W. W. Richardson, on account of displacement of the eye by an orbital growth. There were no symptoms except occasional headache on the affected side. The history is as follows: Six years ago, slight bulging of the left eye was first noticed. Soon thereafter a small tumor was noticed at the inner angle of the orbit. This gradually increased without other symptoms appearing. There had been no nasal discharge, no bleeding; no obstruction, except from a septal spur which was removed about a year after the eye condition was first noticed. His vision had always been found normal; there had never been any inflammation of the eye or orbit. His past history was negative. He had never

*Read in part at the meeting of the Western Section, American Laryngological, Rhinological and Otological Society, Los Angeles, Cal., December 8, 1910.

had syphilis. His general health was unusually good; weight, 140 pounds.

Examination showed displacement of the left eye forward, downward and outward; no edema of the eyelids; pupils normal in appearance and reaction; there was no muscular paralysis, although on focussing slight faulty action of the left internal rectus was noticed. The growth showed at the inner side of the orbit; the inner canthus was bulging forward. The growth was covered in front by firm bone, apparently due to displacement of the lacrimal bone. Behind the sharp edge of bone the growth felt tense; no fluctuation. There was no redness of the overlying skin and no tenderness to deep pressure.

Nasal examination showed slight septal deflection to the left; a scar along the vomer ridge in front (spur operation); the middle turbinate was somewhat larger than normal, with two or three small polyps on its anterior end. No pus could be seen, even after prolonged shrinking. (The tissues did not seem to shrink with cocaine and adrenalin as much as normal.) Postnasal examination was negative. Transillumination: Frontals large and clear; left antrum, slightly dark over its upper part; left semilunar orbital light area entirely gone (affected side); right antrum normal and orbital illumination clear.

The patient was referred to Dr. A. L. Macleish for examination of the eye. He reported the eye examination negative, except for the displacement, which he found as follows: Outward, 9 mm.; forward, 3 mm.; downward, 2.5 mm. Dr. Macleish said he believed the growth was ethmoidal and likely a mucocele. It should be stated that the patient had been examined several times and given a diagnosis of "new growth, likely sarcoma." The writer also failed to suspect mucocele until suggested by Dr. Macleish.

Operation was advised and done November 4th. The operative notes are as follows:

November 4, 1908. Operation, Good Samaritan Hospital. Curved incision in front of the inner canthus extending along the inner half of the eyebrow and downward along the side of the nose. Tissues incised down to the periosteum of the orbit; elevated outwards. Necrosed and ragged defect in the outer plate of the ethmoid, size of a finger, leads to a bony

encysted mucocoele of considerable extent; estimated about one-half again to twice as large as the size of a normal ethmoid labyrinth; full of fluid, serous on top, thin mucus at the bottom of the cavity. Cavity extended inward and downward on the outer wall of the nose, but without any connection with the nasal cavity; extended backward to the sphenoid and upward, communicating with the frontal. The cyst was lined by thin mucous membrane, purplish red in color. Its bony wall was egg-shell in character and showed no carious defect except that in the orbit. The capacity of the cyst was estimated at from one and one-half to two tablespoonfuls. The whole of the cyst wall was removed. After removal thorough drainage in the nose existed in as much as the outer wall of the nose formed the inner wall of the cyst. The cavity was packed with bismuth gauze, the end extending into the nose. Complete closure of the outside wound with horsehair sutures. No external drainage.

November 12th. Convalescence uneventful; leaves hospital to-day (eighth day) with collodion strip. No diplopia has been noticed.

November 16th (twelfth day). Good scar; all dressing removed two days ago. Eye has returned to its normal position toward the midline; slight downward displacement remains. Very slight edema of the eyelids remains.

November 25th (twenty-first day). Patient leaves for his home in Texas entirely well. Good scar; no nasal discharge. Eyeball is in accurate position except for very slight downward displacement. No forward displacement. The globe moves in all directions normally, except on extreme elevation there is very slight lagging.

Eye examination after recovery.—Dr. Macleish reported that there was no forward displacement, but downward displacement was 4 mm., and outward displacement reduced from 9 to 3 mm.

June 27, 1910. Dr. C. P. Hall, of Texas, kindly reported that the patient had remained entirely well; no sign of tumor or protrusion. Vision of each eye 20/15. Convergence 4". Left eye slightly deviating. Motility of each eye perfect.

MUCOCELE OF MAXILLARY ANTRUM.

CASE 2.—Miss A. C., age 19, referred by Dr. Sidebotham of Santa Barbara and Dr. Geo. W. Lasher of Los Angeles on November 11, 1910, on account of a swelling in the left cheek and thickening of the alveolar process and malposition of the left upper teeth.

The history dates back two years. The first sign noticed was bulging of the gum above the left upper teeth (bicuspid and first molar). There was no soreness, such as from an ordinary "gum boil." Her physician lanced the gum several times; thinks there was but slight discharge. She was then sent to a dentist and the left upper first molar was removed and it was found apparently sound. The dentist drilled a hole into the antrum, and considerable discharge followed. The discharge was not like that of a "cold in the head"; was usually clear, slightly bloody at times; never any odor. Following the antrum puncture she thinks there was some nasal discharge of a similar character for a short while; never any nasal discharge before this drill puncture and none since.

The malposition of the teeth was first noticed two years ago and has not changed. The discharge through the opening in the tooth cavity continued up to about two months ago. It would at times cease; she would then force an opening by use of a syringe. The hard thickening of the alveolar process had never much changed. The cheek swelling persisted and would be most noticeable when, at times, the alveolar fistula closed. There had never been any pain in the cheek, although occasional pain in the temporal region. Her general health has not been good; referred to some abdominal trouble (ovarian), for which has recently been in a hospital.

The examination notes are as follows: There is considerable displacement of the left upper canine and first and second bicuspid teeth. The biting surfaces of the teeth are turned inward, as if from pressure outward on the roots. The alveolar process is thickened and hard, and the hard thickening extends over the anterior antral wall, completely filling out the canine fossa and the usual hollow below the molar prominence. There is no sign of the fistula in the molar tooth cavity. The alveolar mucous membrane seems normal except for capillary dilatation over the swelling.

Nasal examination proved absolutely negative; no signs of pus or polyps or hypertrophies. The nasoantral wall was not bulging. The transillumination proved negative. If anything, the left antrum was brighter than the right, and decidedly brighter about the center of the cheek. X-ray examination showed slight thickening of the shadow of the nasoantral wall, but unusual clearness of the anterior wall, and twisting of the teeth.

Attempt to syringe the antrum through the puncture under the inferior turbinate caused such severe pressure in the cheek that the attempt was abandoned. At the time the trocar was felt to have penetrated the bony wall and it was (mistakenly) believed to have entered a growth in the antrum that prevented the solution from returning through the natural antral orifice.

A diagnosis of "new growth, likely sarcoma," of the superior maxilla and antrum had been made. The writer was inclined to the same diagnosis, although opening the antrum through its anterior wall before considering an extensive resection was the procedure agreed upon by all concerned.

The operative notes are as follows: November 17, 1910. Operation, Good Samaritan Hospital. Incision through the mucous membrane and alveolar process; mucous membrane and periosteum elevated, laying bare anterior antral wall. The bony wall was found very much thinned and bulging, easily broken through by light use of chisel and enlarged with curette. Immediate gush of clear brownish amber fluid with some stringy mucus in the bottom of the cavity. The whole of the anterior wall was removed by forceps. Examination showed that the antral cavity was very much enlarged below, extending well into the alveolar process, which apparently had been hollowed out. The mucous membrane was slightly more red than normal and very slightly thicker, but did not present the usual characteristics of a suppurative membrane. The cavity was a closed cavity; there was no trace of the natural opening. The nasal wall of the cavity and the orbital wall were apparently not at all distended, only thin. The thinning and distension was confined to the anterior wall and the alveolar process. From the appearance, a diagnosis of mucocele was made. A window was made in the nasal wall after removal of the anterior end of the inferior turbinate. The

antral cavity was then lightly packed, the end of the packing being brought out of the nose and also out of the alveolar wound.

February 5, 1911. The antrum packing was removed soon after operation. The discharge (clear, amber colored) gradually decreased and has now ceased. The mucous membrane of the antrum was from time to time swabbed with 10% nitrate of silver, and has become thin, pale and dry. The roots of the teeth were found dead and were amputated and filled (by a dentist). A plastic operation is to be done to close the alveolar opening.

MUCOCELE OF BOTH FRONTAL SINUSES.

CASE 3.—Since the report of the above two cases, the remembrance of a peculiar frontal sinus case which I had some three years ago caused me to review the notes of the case. Although a diagnosis was then made of chronic suppuration of the frontal sinuses, with "closed empyema," yet on looking back over the history, I believe it certainly was a case of mucocele in which the suppuration was secondary. The notes are as follows:

Mrs. B. H., age 42. Referred April 30, 1908, by Dr. Clarence Cook, on account of pain and swelling above the right eye. She has suffered with pain in the head, off and on for eight years. About five years ago the left frontal became swollen and painful; "something seemed to break"; she spat out a good deal of foul pus that dropped back into the throat. The pain in the left frontal then ceased and she remained well for two or three years. During this time she is sure there was no discharge from the nose. The pain and swelling in the left frontal then returned, the eye became badly swollen, so much so that the patient claims the sight was despaired of. The swelling over the left eye then "broke" and discharged through the eyebrow with relief of symptoms. Since then the left side of the head has been well.

The present trouble, pain and swelling of the right eyebrow, dates back two or three years. The swelling would "come and go," accompanied by severe pains in the head. At such times pain would be so severe that opiates were required. At no time during these attacks or between attacks was there discharge from the nose, front or back. She is quite sure the

only time there was ever any nasal discharge was five years ago, when she spat up "considerable matter," as previously stated. About three years ago, during an attack of headache, she was very feverish; thinks she was unconscious for a few hours. General health good. Married and has ten children. She is not of a nervous temperament.

Examination.—Good health apparent. Right frontal region shows a distinct swelling above the inner end of the right eyebrow and very slight swelling of the right upper lid. The swelling is about 1 inch in diameter, bulging, moderately tense, tender to touch, skin not adherent. The swelling extends below the supraorbital ridge, which can only be felt along its outer half. Left frontal region negative.

Nasal examination.—Hypertrophy of the right middle turbinate, which is firm and red; middle meatus considerably narrowed by the swollen turbinate. No sign of pus or polyps. Left side of nose practically normal. Postnasal examination is negative, except for congestion in right middle meatus. Careful shrinking of the turbinates with cocaine and adrenalin fails to show any leakage of pus. (Diagnosis was quite uncertain.)

May 1st. Re-examination showed no change except pain was less.

May 4th. Two days ago patient had a chill; was seen by Dr. Cook, who found temperature $103\frac{1}{2}$. Suffered considerably. No discharge from the nose occurred. Temperature dropped to normal the following day, but the pain and swelling continued. She is now suffering much pain. The only other development is that of herpes labialis on both lips on both sides of the midline. Patient states that every time she has severe attack of pain and fever in the head there is a similar eruption on the lips. Examination failed to show any scar in the left frontal (where the swelling on that side years ago is said to have broken). No involvement of the third, fourth, fifth or sixth nerves. Operation advised.

The writer was unable to make a positive diagnosis. The family physician had thought of a growing tumor and had considered the possibility of a gumma. The history of the left side made it probable that there was pus in the right frontal.

May 6th. Operation. Right frontal opened by eyebrow in-

cision. Its outer wall close to the inner angle showed a necrotic (?) opening, fully 2 cm. in diameter, below which the periosteum of the orbit seemed adherent. The sinus was full of yellowish green pus without odor. The mucous membrane of the frontal was thick, pulpy and red. The cerebral wall of the sinus showed about the center a small opening about $\frac{1}{2}$ cm. in diameter, where the dura was exposed. (Evidently an old opening.) There was also a perforation of the septum between the two sinuses; pus of the same character could be wiped out of the left frontal. Complete exenteration of the right frontal was done; the wound partly closed. The left frontal was then opened and treated in like manner. Its mucous membrane was thick, pulpy and red; no dura exposed. On neither side could a probe be passed into the nose; the frontal duct seemed entirely closed. With difficulty an opening was made into the nose on the right side.

The diagnosis seemed to be closed empyema of the frontal sinuses.

Microscopic examination of the pus by Dr. E. L. Leonard showed small diplococci, probably "diplococcus catarrhalis."

May 20th. Patient discharged from hospital.

June 6th. Convalescence uneventful. Has had some post-nasal discharge. Patient is quite positive she had never had discharge like this from the throat or nose before operation except at the time mentioned five years ago.

September 1st. Left frontal entirely healed.

October 10th. Both frontals healed, with a depressed scar on each side.

This third case was at the time a confusing case and, as above noted, a diagnosis of "closed empyema" was made. I now believe it was a case of mucocoele in which the septic inflammation was secondary.

REMARKS.

These three cases of mucocoele were interesting and are reported, not only because of their comparative rarity, but also on looking up the literature of the subject, it seems that mistaken diagnoses, as in these cases, have not been at all unusual. It is noteworthy that sarcoma was strongly suspected in two of these cases. The absence of nasal symptoms and the presence of marked deformity no doubt have been responsible for

the diagnosis of "new growth" in many cases similar to my own.

Etiology.—A review of the reported cases of mucocoele fails to find an adequate explanation of the cause of this rare condition. Turner's instructive paper is probably the best on the subject. He says the etiology is still uncertain; that probably the best explanation is the existence of a catarrhal process that has blocked up the normal nasal ostia. Yet, in some of the reported cases the ostia have been found to be open. Turner found that in 21 out of 22 ethmoid cases he reviewed the age was less than 30. Yet, in Stewart's case (frontal) the age was 62 and in di Santo's case (frontal and ethmoid) the age was 60.

Diagnosis.—Of the 40 cases here reviewed (including the three cases above reported) it is noteworthy that mistaken diagnoses were not uncommon, sarcoma, osteoma or "new growth" being often suspected. As a rule, there was no nasal discharge and frequently nothing abnormal to be seen by intranasal examination. The external signs point to a slow growing tumor.

The tumor, as a rule, shows up at the inner angle of the orbit; is tense, often surrounded by a thick bony margin; fluctuation cannot, as a rule, be detected. The displacement of the eyeball is rather constant, and yet seldom is the eye affected. (Case 1 is typical; yet in Knapp's case there was blindness in both eyes.) Diplopia and epiphora occasionally are present. The skin and overlying tissue is normal, unless secondary septic infection has occurred. The length of time the tumor and eye displacement have been noticed is remarkably long in some cases (see the tabulated review of these cases). The amount of facial deformity that occurs is interesting. In Moure's case (diagnosed "sarcoma") the mucocoele had forced the nasal bones upward and apart. The same was true of the case reported by Sibileau.

In the writer's second case (mucocoele of the antrum) the alveolar process had been hollowed out and forced outward; the teeth had been rotated, the roots forced outward with the biting surfaces turned markedly inward. In spite of such evident pressure changes, the nasoastral wall, as seen by intranasal examination, was absolutely normal. There was no bulging to be seen either in the outer nasal wall nor in the floor of the nose. Transillumination shows, as a rule, a light area over the

sinus affected (a few exceptions). One diagnostic procedure of immense value has been overlooked by many, including the writer. It is so simple and so sure of preventing a mistaken diagnosis that it would seem almost puerile to mention it, except for the failure on the part of many to do it—namely, aspiration of the tumor. In the writer's antrum case, the naso-antral wall was punctured, as usual, to wash out the antrum. The attempt caused such a feeling of pressure and severe pain in the cheek that it was abandoned. Had the writer aspirated the antrum, the diagnosis would have been cleared up. Instead, the operation was undertaken with the fears of existence of a serious malignant disease. Others have had the same experience.

Findings.—Of these 40 cases, the ethmoid cells were affected in 20 cases, the frontal sinus in 23 cases, the sphenoid in two cases, and the maxillary antrum was found involved only in three cases (including the writer's case, Case No. 2). In the other two cases (of Bichaton) there was bulging over the alveolar process. Where the ethmoid is involved it is usually found that the labyrinth has been completely changed into one large cavity, of smooth, egg-shell-like walls. The defect in the orbital wall is in the lamina papyracæ; the lacrimal bone is often displaced forward, giving the bony feel to the orbital tumor. Behind this the tense tumor is felt. In the frontal cases, the defect is usually in the lower or orbital wall, although in a few cases the anterior wall has been "worn through." In a few cases (as in the writer's frontal case) the posterior wall shows a defect, with the dura adherent to its margin.

The character of the secretion varies from clear mucus to brownish thick gelatinous material; occasionally greenish yellow; usually odorless. In only a few cases is cholesterin reported to have been found. The secretion is usually sterile.

Histologic examination is reported in several cases. The epithelial changes were found to be variable and of no special significance; areas of columnar cells with or without cilia, interspersed with areas of flat cells. The subepithelial changes found were usually those of a mild inflammatory nature.

Operative Measures.—From a review of the histories of the reported cases, it would seem that operative success depends on establishing a large drainage opening into the nose. Exter-

nal incision alone seems to have been unsuccessful; recurrence following. It does not seem to be necessary to remove the mucous membrane of the sinus, as in the frontal or maxillary antrum. This is fortunate, inasmuch as prolonged after treatment and depressed scar formation (for frontal cases) is prevented.

For the ethmoid cases when the cyst is seen bulging in the middle meatus, removal of the nasal segment without external operation has given good results in the hands of some (Fullerton's case). This presents the advantage of confirming the diagnosis and radically curing the case by intranasal operative procedure under cocain. However, as in many ethmoid cases, the nose is found normal, the orbital swelling is naturally the point of attack. The whole of the cyst wall can then be removed, including the nasal segment (which establishes perfect drainage), and the orbital wound closed at once, as in the writer's case.

For the frontal cases, in addition to attacking the orbital swelling, good drainage into the nose, it seems, must be established.

For the rare cases, involving the maxillary antrum, there seems to be no reason why the usual intranasal operation, window resection in the inferior meatus, should not suffice. It is at least worth while trying before resorting to the external operation through the anterior antral wall.

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REPORTED CASES OF MUCOCELE OF THE NASAL ACCESSORY SINUSES.

No.	Reported by	Sinus Affected.	External Signs.	Intranasal Signs.	Method of Treatment.	Findings.
1	Robt. Fullerton.	Ethmoid.	Orbital swelling and eye displacement (three months).	Bulging of middle turbinate; no nasal discharge.	Intranasal.	One ounce grayish yellow viscid mucus.
2	Robt. Fullerton.	Ethmoid.	Orbital swelling (three months; off and on for several years).	Bulging of middle turbinate; periodic nasal discharge.	Intranasal.	Mucopus (secondary septic infection).
3	Robt. Fullerton.	Frontal.	Orbital swelling and eye displacement (two months). Similar swelling four years before.	Bulging of middle turbinate; no discharge.	Intranasal.	Mostly thin mucus with some thick yellow secretion.
4	A. Logan Turner.	Frontal.	Orbital swelling and eye displacement (two and a half years).	Normal, except swelling anterior end of middle turbinate.	Incision two years earlier; recurrence. External operation and removed middle turbinate.	Purulent fluid. Dura found exposed. Floor of frontal and lacrimal bone gone.
5	A. Logan Turner.	Frontal.	Frontal and orbital swelling. Eye displacement (four years).	Normal.	External operation; recovery in six months.	Clear, serous. Dura found exposed in floor. (Staphylococcus in cultures).
6	A. Logan Turner.	Frontal.	Orbital swelling (eight years). Orbital fistula (from previous incision). Eyeball displaced.		External.	Pus and granulations (two previous unsuccessful operations; incisions and curettements).
7	A. Logan Turner.	Frontal.	Orbital swelling. Eye displacement, diplopia (three months). Vision normal.	History of periodic discharge from both sides (watery). Enlarged bulla ethmoidale; no pus.		Mucus; no cells and no bacteria.

8	A. Logan Turner.	Frontal.	Swelling upper eyelid (six weeks).	No nasal discharge; bulging middle meatus.	External (mucosa not removed).	Thick, slimy fluid, greenish brown (transillumination had been particularly bright). Mucosa slightly thick.
9	A. Logan Turner.	Frontal.	Orbital swelling (six months). Eye displacement, diplopia.	Normal.	External.	Pus, yellowish green, foul smelling. Cocci in pairs, chains and a few bacilli.
10	A. Logan Turner.	Frontal.	Orbital swelling (nine months). Eyeball displaced. Considerable exophthalmos, diplopia, Fundus normal.	Normal, history of no discharge.	External first. Later intranasal drainage.	Mostly clear, some thick white (resembles soft brain tissue). No dural exposure. Mucosa normal.
11	A. Logan Turner.	Ethmoid.	Orbital swelling (one and a half years).	Negative. No discharge. Vague history of discharge, transillumination, clear.	Incised. Recurred. External and intranasal.	Mucus. No cholesterin and no germs.
12	A. Logan Turner.	Ethmoid.	Orbital swelling (five years).	Hard swelling middle meatus; no discharge.	External and intranasal.	Sticky, gelatinous (not pus).
13	Turner.	Ethmoid.	Orbital swelling (nine years). Eyeball displaced. Orbital abscess (for four or five days).	Swollen middle turbinate; no discharge.	External and intranasal.	Pus.
14	McKenzie.	Ethmoid.	Orbital swelling (fourteen months). Eyeball displaced.	Swollen middle turbinate; no discharge.	Intranasal.	Mucus.

No.	Reported by	Sinus Affected.	External Signs.	Intranasal Signs.	Method of Treatment.	Findings.
15	F. J. Stewart.	Frontal.	Orbital swelling (eleven years). Incised and reappeared after three years.	History of discharge.		
16	Rollet.	Frontal.	Orbital swelling (following a blow, twelve years).	Nasal polyps.	External (Killian).	Mucilaginous liquid.
17	Bellingona.	Ethmoid.	Orbital swelling (following a blow, ten years).		External.	
18	Di Santo.	Frontal and ethmoid.	Orbital swelling involving upper lid (inflammatory frontal). Orbital swelling, at inner angle (mucocoele).	Swelling of ethmoid region, filling middle meatus. History of chronic catarrh.	External.	Pus and streptococci. Staphylococci.
19	Scimena.	Frontal.	Orbital swelling.			
20	Bichaton.	Maxillary sinus.	Facial asymmetry; small tumor over the premolars, covered with normal mucous membrane. Transillumination, dark.	Obstruction nasal fossa.	External incision. Speedy recovery.	Mucus with some pus.
21	Bichaton.	Maxillary sinus.	Hard swelling in canine fossa, covered with normal mucous membrane.	Hard swelling of floor of nose.	External incision.	Brownish purulent material. Mucous membrane pale and thin.
22	Onodi.	Ethmoid.	Orbital swelling (six years). Eye displaced; vision normal.			Mucus, cholesterol crystals, white and red blood cells.

23	E. J. Moure.	Ethmoid.	Enlargement of the root of the nose. Exophthalmos (slight). Vision normal.	Red, smooth tumor, causing elevation and separation of nasal bones; sarcoma suspected.	Resection of nasal bones.	Mucoid material (sterile).
24	E. Morini.	Frontal.	Exophthalmos. Orbital tumor, in vault of orbit.		External, without removal of frontal sinus mucous membrane.	Coffee colored mucoid material; some pus.
25	A. Casali.	Frontal.	Orbital tumor (several years).		External.	Thick, dark orange colored; red and white blood cells and cholesterolin.
26	Alroldi.	Frontal, Ethmoid.	Orbital tumor (three years). Frontal tumor (one year).	Soft, smooth, red tumor.	External (after intra-nasal puncture).	Greenish yellow.
27	Cirincione	Sphenoid, Ethmoid.	Exophthalmos. Orbital tumor. Diagnosis of retrobulbar tumor had been made, and operation advised against.	Tumor in nasal fossa.	External and nasal opening.	Grayish liquid.
28	Moreau.	Frontal.	Large orbital tumor.		External.	Mucilaginous.
29	Sibilleau.	Ethmoid (left).	Swelling of root of nose; nasal bone (left) raised.	Soft tumor, red, 2 c. m. from vestibule. (Diagnosis of sarcoma.)	Resection of nasal bone and process of superior maxillary.	Colloid mucus.
30	Van Duyse.	Ethmoid.	Orbital tumor. Exophthalmos; diplopia; lacrimation. Diagnosis of suppuration, osteoma or myxosarcoma.	Negative.	External.	Large amount grayish material.

No.	Reported by	Sinus Affected.	External Signs.	Intranasal Signs.	Method of Treatment.	Findings.
31	Gandair	Frontal.	Orbital tumor (four years).		External (frontal curetted).	
32	Solterl.	Ethmoid.	Orbital tumor (four years). Slight exophthalmos.		Intranasal.	Gelatinous material.
33	Compaired.	Ethmoid.		Round tumor obstructing right nasal fossa. (First diagnosis, fibrosarcoma).	External. Resection nasal bone.	
34	Baurowicz	Ethmoid.	Eyeball displaced; orbital tumor; epiphora.	Swelling at lower edge of middle turbinate (broken into with escape of turbid fluid).	Intranasal (recovery by puncture).	
35	Macleish.	Ethmoid.	Orbital tumor (had been diagnosed osteoma). Displacement of eyeball (five months). Vision impaired. Nerve head swollen.		External with nasal drainage.	
36	Knapp.	Ethmoid (right and left). Sphenoid (right and left).	Orbital swelling (right and left). Exophthalmos right and left. Blindness from optic atrophy (right and left).	Nasal obstruction (both sides).	External.	Large amount of brown liquid; cholesterolin.
37	Knapp.	Ethmoid.	Orbital swelling. Exophthalmos.	Negative.	External.	Mucopus liquid.

LIV.

THE ANATOMY AND PHYSIOLOGY OF THE
SALIVARY GLANDS.*

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When I received an invitation to introduce the Symposium on the Salivary Glands, I knew it was not on account of any original research that I could bring to this society, but rather to introduce the framework for the more practical part of this Symposium. The anatomy and physiology of the salivary glands, as I present them, contain nothing new, but if the brief description of the salient points that I give will be found of some value, I shall feel amply repaid for my endeavor.

The oral salivary glands are divided into two groups: the more important group, the three large paired salivary glands, the parotid, the submaxillary and the sublingual, and the numerous smaller glands, which are found generally distributed in the mucosa of the oral cavity, and are to be classed in the following groups: the labial glands, in the submucosa of the lips; the buccal glands, found between the buccinator muscle and the oral mucous membrane; the palatine glands, found in the mucous membrane of both the hard and soft palates, and especially on the uvula; the molar glands, in the mucous membrane behind the last molar teeth, and the lingual glands, which are situated beneath the mucous membrane of the tongue, particularly in the region of the circumvallate papillæ and along the lateral margins.

The parotid gland, the largest of the salivary glands, is a flattened, somewhat triangular shaped structure, of a grayish yellow color, distinctly lobulated, weighing from one-half to one ounce, situated on the side of the face, in front of the

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external ear. It extends as high as the zygoma and as low as the angle of the lower jaw. It covers approximately the posterior third of the masseter muscle, and extends backwards to the external auditory meatus, the mastoid process and the sternomastoid muscle, and is lodged in the space between the ramus of the lower jaw and the mastoid process.

It should be noted, when operating upon this region, that this space can be increased in size by extending the head. With the mouth open, the angle of the jaw is carried backward and the condyle forward, increasing the width of the space above and diminishing it below. In infants, owing to the obliquity of the ramus of the jaw, the space is broader in proportion. In advanced age, also, the space is broader below when the angle of the jaw projects forward.

The gland is divided into four lobes: the glenoid lobe, the pterygoid lobe, the carotid lobe, and the socia parotidis or accessory parotid gland. The glenoid lobe extends upward in the posterior part of the glenoid cavity, which it occupies; the pterygoid lobe extends forward beneath the ramus of the lower jaw between the external and internal pterygoid muscles; the carotid lobe passes behind the styloid process and beneath the mastoid process and the sternocleidomastoid muscle; the socia parotidis consists of a number of lobules resting on the masseter muscle above. It is quite separate from the gland proper, and is known also as the accessory parotid gland. It has a separate duct which empties into the duct of the parotid.

Covering the parotid gland is a strong and dense layer of fascia, which is a prolongation of the deep cervical fascia. This sheath divides into two layers, one passing over and the other internal to the gland. The internal layer of the fascial sheath is deficient between the internal pterygoid muscle and the styloid process, admitting the extension of the parotid gland to the lateral pharyngeal wall. The deep fascia of the neck sends beneath the gland a process continuous with the stylomaxillary ligament, which separates the parotid from the submaxillary gland.

The parotid gland is important not only on account of its function, but on account of the relation it bears to the surrounding parts and the important structures found within the substance of the gland. These structures are, from with-

out inward: 1, the facial nerve with its cervicofacial and temporofacial branches; 2, the temporomaxillary vein; 3, the superficial temporal vein; 4, the internal maxillary vein; 5, the posterior auricular vein; 6, a branch from the temporomaxillary vein to the internal jugular vein; 7, the external carotid artery and its terminal branches, the temporal and internal maxillary arteries; 8, the great auricular and auriculotemporal nerves.

The relation of the surrounding parts is as follows: the parotid gland is separated from the internal carotid artery, the internal jugular vein, and the pneumogastric, glossopharyngeal and hypoglossal nerves by a thin layer of fascia. By virtue of this relation, swelling of the gland, as in mumps, may cause a passive cerebral congestion by compression of the internal jugular vein. From the position which the gland holds, with reference to the temporomaxillary articulation, it follows that in severe inflammation of the gland, movement of the jaw is attended by great pain and marked interference with depression of the jaw, or involvement of the joint. The deficiency in the fascial sheath of the gland on its inner surface, between the internal pterygoid muscle and the styloid process, is at times responsible for the extension inward of pus from a parotid abscess into the temporal fossa by way of the pterygomaxillary region. Cases of retropharyngeal abscess or retropharyngeal growths of large size, may cause swelling in the parotid region, and, conversely, growths of the parotid may bulge into the pharynx. On account of the intimate relation existing between the parotid gland and the external auditory meatus, it should be borne in mind that a parotid abscess may open into the external auditory canal.

Stenson's duct, or the duct of the parotid gland, runs transversely across the face, about one-half inch below the zygoma, or in a line drawn from the lowest point of attachment of the concha, to a point midway between the free margin of the lips and the ala of the nose. It is from two to two and one-half inches in length, and one-eighth inch in diameter, and narrow at its oral end. The duct appears at the upper portion of the anterior margin of the gland, runs over the masseter muscle and bends abruptly in front of its anterior border, passes through the buccal fat pad and pierces the buccinator muscle to open into the mouth as a rounded slip, oppo-

site the crown of the second molar tooth of the upper jaw. This orifice is from one to two mm. in diameter. This bend in the duct must be remembered when passing a probe into the duct from the mouth. The duct is formed by numerous small ducts, and it receives the duct of the accessory parotid.

The submaxillary gland is of rounded, irregular form, yellowish white in color, and weighs about two drachms. It is distinctly lobulated, the lobules being much larger than those of the parotid. It is situated in the submaxillary region, below the lower jaw and above the digastric muscle. It extends upward under the body of the lower jaw as far as the attachment of the mylohyoid muscle. It consists of two portions—a larger superficial portion, and a smaller deep portion. The superficial portion lies immediately beneath the skin, platysma and cervical fascia, the latter forming a fibrous capsule for the gland, excepting externally, where it is in contact with the body of the jaw. It grooves the inner surface of the lower jaw. It rests upon the mylohyoid, hyoglossus and styloglossus muscles. In front of it is the anterior belly of the digastric, and behind it is the stylomaxillary ligament, which separates it from the parotid gland. The facial artery grooves its deeper surface. It is in close relation with the inframaxillary branches of the facial nerve, the facial artery and vein, the lingual vein and the hypoglossal nerve. The smaller or deep portion turns around the posterior or free border of the mylohyoid muscle, and lies between it and the hyoglossus muscle.

The submaxillary or Wharton's duct is about two inches long, and has its origin in the deep portion of the gland. It is given off from the upper part of the gland and winds around the posterior border of the mylohyoid muscle, then lies on the hyoglossus muscle and passes forward over the geniohyoglossus muscle, beneath the sublingual gland, producing the sublingual fold with the floor of the mouth and terminating in a constricted opening in the floor of the mouth at the side of the lingual frenum, beneath the tip of the tongue. Near its termination it is joined by one of the ducts of the sublingual gland—the duct of Bartholin.

The sublingual is the smallest of the salivary glands. It is an elongated, flattened structure, of a white or light gray color, being lobulated like the other salivary glands. It

measures from one to one and a half inches in its long diameter, and weighs about a drachm.

It lies immediately underneath the mucous membrane of the floor of the mouth, at the side of the lingual frenum, where it produces an oblong prominence distinctly seen when the tip of the tongue is raised. It lies upon the mylohyoid muscle, and is in contact on its inner side with the hyoglossus, geniohyoglossus and styloglossus muscles, the lingual nerve and the duct of the submaxillary gland. Its outer border is lodged in a depression in the body of the lower jaw, called the "sublingual fossa." Behind, it is in relation with the deep portion of the submaxillary gland, touching the other sublingual gland in the mesial plane.

This gland does not possess a common duct, but the secretion from the distinctly separated glandular components is poured out through ten to fifteen small ducts which empty into the mouth by a number of small orifices situated on the ridge at each side of the frenum. These ducts are known as the ducts of Rivinius. The anterior portion of the gland frequently gives off a somewhat larger duct, which is called the duct of Bartholin, and this either empties independently beside the orifice of the submaxillary duct or empties into it immediately before its termination.

The salivary glands are of the compound saccular or racemose variety. Each gland is enveloped in a dense, fibrous capsule, from which connective tissue septa penetrate the organ, dividing the gland into lobes. These lobes are subdivided by fibrous partitions into numerous lobules, each of which is composed of groups of ultimate saccules or alveoli. The glands are supplied by ducts, which ducts divide and subdivide into a number of smaller ducts. Each of these ultimate divisions of the ducts at last ends in an alveolus or secreting portion of the gland. Sometimes a duct ends in a single alveolus, but more commonly a duct ends in several alveoli.

Histologically the salivary glands are of two distinct groups—the serous or albuminous glands, and the mucous salivary glands. Those of the serous type are regarded as the true salivary glands, and are represented by the parotids, while the mucous type are shown in the sublingual glands. The mucoserous or mixed glands are exemplified by the submaxillary glands.

The alveoli of the glands are limited by the basement membrane, the prolongation of the smaller ducts, and are almost completely filled by irregular polyhedral granular epithelium, the narrow intercellular cleft representing the commencement of the lumen of the system of ducts. The appearance of the cells varies with the stages of secretion. When quiescent, the cells are large, their outlines indistinct, and studded with granules. During activity the cells become smaller, their outlines more distinct, and the granules disappear, especially from the outer portions of each cell. After prolonged activity the cells are still smaller, their outlines still more distinct, and the granules have disappeared almost entirely, a few only being left at the extreme inner margin of each cell. The cell substance loads itself with special products which are discharged from the cell as a part of the secretion, and the cell substance stirred up to increased growth subsequently manufactures a new supply of the product.

The old idea was that the specific activity of a gland was confined to the task of extracting certain constituents from the blood. Experiments have shown that the specific constituent of each secretion is formed in the gland itself, but the fluid secreted by a gland consists not only of its specific substance, but of a large quantity of water and solids, which water and solids may or may not be furnished by the same metabolic activity which produces the specific constituent. At all events, it is the assumption that it aids in producing the water and solids.

The blood supply to the salivary glands is very rich. The larger arteries accompany the excretory ducts of the glands within the interlobular, fibrous septa, where they give off branches which penetrate the lobular tissue, to end in rich capillary networks enclosing the alveoli. The capillaries lie immediately outside the basement membrane, in proximity to the secreting cells.

The salivary glands receive their nerve supply from two general sources—namely, from the cerebral nerves and from the sympathetic.

The parotid gland receives its fibers from the glossopharyngeal, by way of the auriculotemporal branch of the inferior maxillary division of the fifth cranial nerve. The sympathetic fibers are from the cervical sympathetic.

The submaxillary and the sublingual receive their cerebral fibers from the chorda tympani, by way of the facial nerve, and from the cervical sympathetic.

The salivary glands possess definite secretory nerves which, when stimulated, cause the formation of a secretion. This fact indicates that there must be a direct contact of some kind between the termination of the secretory fibers and the gland cells. From the larger trunks of the interlobular network, along the course of which minute ganglia occur, smaller branches enter into the lobules and extend between the alveoli to form a terminal network in contact with the cells, following thus the general schema for connection between nerve fibers and peripheral tissue.

Many interesting experiments have been undertaken to show the results from stimulation of the several nerves which supply the glands, in order to determine the exact nature of the act of salivary secretion.

Not only are secretory fibers carried to the glands by these paths, but vasomotor fibers are contained in the same nerves, and the arrangement of these vasomotor fibers is such that the cerebral nerves contain vasodilator fibers, whose stimulation causes a dilatation of the small arteries in the glands and an accelerated blood flow, while the sympathetic contains vasoconstrictor fibers whose stimulation causes a constriction of the small arteries and a diminished blood flow.

Stimulation of the chorda tympani results in a free and abundant flow of thin and watery secretion, containing not more than one or two per cent of solids, and an increased flow of blood through the glands. The whole gland is of redder hue, showing dilatation of the small arteries.

If the sympathetic fibers be stimulated, the secretion is relatively small in amount, flows slowly and is thick and turbid, and may contain as much as 6 per cent solids. At the same time, the gland becomes pale, showing that vasoconstriction has taken place. It would seem, therefore, that stimulation of the chorda tympani has the effect of promoting the discharge of water, while stimulation of the sympathetic has a marked effect in promoting the discharge of mucin. This would suggest that there are two kinds of fibers going to the glands, those called the trophic, and those called the secretory. The secretory fibers govern the secretion of water and salts, and

the trophic govern the formation of the specific constituents. The cerebral nerves contain the secretory fibers, while the sympathetic nerves contain the trophic fibers.

Stimulation of the auriculotemporal produces a generous flow of limpid saliva. Stimulation of the sympathetic produces in itself little or no secretion, but when the sympathetic and auriculotemporal nerves are stimulated at the same time, the saliva which flows is much richer in solids, and especially in organic matter, than when the auriculotemporal is stimulated alone.

The flow of saliva is a nervous reflex phenomenon acting as a result of efferent impulses, affecting the secreting cells directly, while the vascular changes which occur simultaneously may assist, but they are not the direct cause of the flow.

Saliva is excreted into the mouth intermittently as occasion demands. While fasting, only a small quantity is present in the mouth—just enough to keep it moist. When food, or in fact, a body of any kind, is introduced into the mouth, a flow is produced which may be very copious. An abundant flow may result from an emotion, such as the sight or smell of food or preceding vomiting, when nauseated; and, conversely, secretion may be arrested from fear or anger. The estimated amount of saliva secreted normally, during twenty-four hours, is from one to two pints.

Atropin paralyzes the endings of the secretory fibers and inhibits the flow of saliva. Injection of sodium bicarbonate into Stenson's duct arrests the action of the secretory fibers and diminishes the flow of saliva. Pilocarpin increases the flow of saliva by stimulating the endings of secretory fibers and will remove the paralysis caused by atropin. Opium makes the mouth dry by acting on the salivary center in the medulla. The salivation by mercury is due to excessive metabolism of the gland cells themselves.

Saliva as it appears in the mouth is a mixture of the secretions of the parotids, submaxillaries and sublinguals, and the lesser mucous glands. It is a colorless or opalescent, thick and generally frothy fluid. It has a specific gravity from 1002 to 1005, with a weakly alkaline reaction. When secretion is scanty, or in dyspepsia, the reaction may be acid. Microscopically may be seen particles of food, numerous flat cells from the epithelium of the mouth, bacteria of various

kinds, spores, mucous corpuscles, granules and salivary corpuscles. Saliva contains about 5 per cent of solids, 2 per cent of which are salts. The most important organic constituents of saliva are mucin and ptyalin. The mucin gives the saliva its ropy, mucilaginous character. Of the inorganic constituents, sodium and calcium carbonate are particularly abundant. There is also considerable CO_2 in solution.

Examination of the separate secretions shows that of the parotid to be clear and limpid and not viscid, for it contains no mucin. Its reaction is alkaline. It is rich in ptyalin.

The secretion of the submaxillary is more alkaline and from the mucin present is more viscid. It contains salivary corpuscles. The secretion of the sublingual is still more viscid and contains the most salts. It also is more alkaline than the secretion of the parotid.

Saliva plays an important part in digestion. Not only has saliva, through the agency of ptyalin, a digestive action on starchy food, but it fulfills other important functions. By moistening the food it softens it, and aids in mastication and deglutition. The presence of mucin doubtless serves as a lubricator for a smooth passage along the esophageal canal. By dissolving dry and solid food it no doubt stimulates the activity of taste sensation. The presence of saliva in the mouth aids materially in ease of speech.

LV.

SYMPTOMS AND DIAGNOSIS OF DISEASES OF
THE SALIVARY DUCTS AND GLANDS.*

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The symptomatology of the most common disease of the salivary glands and ducts, infectious parotitis or mumps, is so well known that I will not dwell upon it. The period of incubation varies from one to three weeks. The premonitory symptoms are very irregular. In one case they may be those of a very mild febrile attack, and in another those of a most profound general infection. Pain and tenderness in the parotid region frequently precedes the swelling. In the very early stages, the glands become swollen, and an edema occurs in the surrounding tissues, which produces a pale swelling in front and below the ear. The physical characteristics present a pathognomonic picture. The distress manifested when attempts are made to eat, especially anything which has a stimulating effect on the salivary glands, is one of the best differentiation tests between acute and chronic salivary adenitis. Chronic mucopurulent inflammation of the glands and ducts presents some very interesting clinical symptoms.

The writer had under his care a few years since a woman about seventy years of age, a person of very rare intelligence. She stated that she had suffered for many years from chronic inflammation of all three of her salivary glands and ducts. During the course of almost every week the ducts would become occluded, the glands, especially the parotids, would swell to a large size, and after a few days of intense agony, the ducts would become open and the intense and distressing symptoms would practically disappear. A peculiar discharge issued from the openings of the ducts. I present herewith

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a drawing of the microscopic findings, which demonstrates a number of eosinophiles. While she remained under my care the attacks were prevented by the systematic dilatation of the ducts, and the use of astringents and germicidal injections. I had a set of probes made for her, which she successfully used in the ducts and which, in a large measure, prevented the return of the most distressing symptoms.

There is another type of symptoms which is presented in cases of chronic suppuration, with necrotic changes in the gland, especially after typhoid fever. Pus and necrotic débris issue from the ducts, and the general condition is most profoundly depressed. The case occasionally ends in death.

The most frequent disease of the salivary system is caused, in the writer's opinion, by some of the forms of so-called gouty diathesis. The symptoms vary from undefined pains beneath the tongue and lower jaw, and in the throat and neck, to localized swelling and pain in a certain gland or a part of a duct, the latter being caused by a deposit of calcareous or gouty material. These symptoms are usually transitory, and make their appearance and subside with the phenomenon of uric acid explosion.

Ranula or cystic dilatation of one of the ducts usually appears at the side and end of the tongue in the region of the ducts of Rivini and Bartholin. When not relieved by puncture or dilatation of the duct, they become so large that the tongue is forced against the roof of the mouth and backward into the oropharynx far enough to threaten the patient with suffocation. At times, a cystic cavity forms in one of the lower glands and extends downward toward the hyoid bone or backward beneath the glossoepiglottic area. Special care must be used to differentiate these from the thyroglossal cysts. Calcareous concretions present some of the most obscure and perplexing symptoms when they form within the gland. The irritation causes the gland to enlarge, and the tense, fibrous network seems to grapple the stone "with a network of steel." The symptoms of spasmodic pain and gradual enlargement terminate in an extensive and hard infiltration and, without surgical treatment, forms a fistulous opening into the mouth or externally on the neck. These extreme cases present the clinical features of cancer, and have been so diagnosed by skillful surgeons, in two cases, which afterwards came under

the writer's care. *Fistulae* form from wounds and injuries to the ducts and glands, and are associated with stubborn symptoms of discharge upon the external surface or into the tissues of the mouth, throat or neck.

Failure to make a correct diagnosis, in the early stages of disease of the salivary apparatus, occurs much more frequently than it should. The technic required does not seem to be appreciated as it should be. A patient will suffer for years from the gradually increasing formative process of a calcareous concretion, and be repeatedly turned away by his physicians as a neurotic crank. These salivary ducts, except those of Rivini and Bartholin, can be explored with the set of probes herewith presented. A needle, which is not very brittle, has enabled the writer to detect chalky material embedded in the gland or duct. After cocainizing, locally and hypodermatically, the needle is placed in a needle-holder, at right angles to the shaft, and made to penetrate the suspected area. The grating feeling, caused by the moving contact of the end of the needle and the hard substance, is pathognomonic. Small tumors, especially of the malignant type, should be removed at once for microscopic examination, as this is the only way that we can confirm a provisional diagnosis of cancer before it is too late. The writer has had X-ray plates taken, which, he believes, in the case of large stones, will be most valuable, although they have not as yet proved entirely satisfactory.

Microscopic and chemical tests of secretions from the ducts, glands and cysts promise much in the way of aid in making a correct diagnosis. They should differentiate between the contents of a salivary and a thyroglossal cyst, and this is extremely important, as the surgical procedure for either case would not succeed if used for the other.

Bimanual examinations have been most useful. With one index finger in the floor of the mouth and the other under the lower jaw, the size and other physical conditions of the sublingual and submaxillary ducts and glands can be approximately determined.

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LVI.

TREATMENT OF DISEASES OF THE SALIVARY APPARATUS.*

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CHICAGO.

In discussing the treatment of the salivary apparatus it is not only necessary to understand fully the anatomy, physiology and diagnosis, but also the etiology and pathologic conditions which must be taken in account in order to comprehensively treat the subject. Since these two topics are not taken up separately in this symposium, I take the liberty of simply mentioning them when necessary. The management of diseases of the salivary apparatus, like many of the borderline subjects, is at the present time still in the hands of practitioners of various special branches, as the dentist, oral surgeon or stomatologist, general surgeon, laryngologist and pediatrician; consequently in gathering up the various opinions from these sources there are many varieties of treatment and some very contradictory statements.

The first group of conditions to be treated comprises affections in which the salivary secretions are changed in quantity and are designated as symptoms rather than diseases.

PTYALISM OR SALIVATION.

This condition, which is characterized by excessive secretion, is present in the following conditions:

1. Dentition in children.
2. Mercurial intoxication.
3. Intoxication from other drugs, as jaborandi, pilocarpin, iodine, copper, curare, lead, nicotine, physostigmine.
4. Irritation during examinations and treatment of the teeth, mouth and throat.

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5. Irritation of the chorda tympani, facial, glossopharyngeal, trigeminal and sympathetic nerves.

6. Facial neuralgia in diseased teeth and ears.

7. Diseases of the nervous system, as bulbar paralysis, postdiphtheritic paralysis, microcephalous and paralysis agitans; mental diseases, as grave neurasthenia, melancholia and hysteria.

8. Gastrointestinal disturbances, intestinal worms.

9. Urinary disturbances.

10. Sexual disturbances in men.

11. Blood diseases, as severe anemia and chlorosis.

12. Pregnancy.

13. General tuberculosis.

The treatment must be directed primarily to the cause; however, some general mode of treatment can always be instituted. In the first place the skin must be made to act as well as the other emunctories, as kidneys and intestine, by laxatives, diuretics and diaphoretics. Large quantities of water should be given and massage friction of the skin is very helpful.

To control the secretion, opium or morphin, chloral, bromids, atropin or belladonna, valerian, antipyrin and cocaine have been employed with more or less success. Locally, painting the surfaces of the mouth about the outlets of the glands with pyoctanin, 1-1000, as well as other astringent mouth washes, as alum, tannic acid, glycerin, are advised. The diet should receive the strictest attention, as such patients lose rapidly in weight from the constant loss of fluid. Besides they may have gastrointestinal disturbances on account of the material interference with the conversion of the starchy food. Starchy food should be withheld to a marked extent.

APTALISM—DRY MOUTH OR XEROSTOMIA.

In this condition we have a marked deficiency of the secretion and this may be unilateral or bilateral. It is found under the following circumstances:

1. Poisoning from atropin, diuretin, nicotin, arsenic, cocaine, acids and alkalies.

2. Paralysis of the facial and sympathetic nerves.

3. In cases of marked diuresis, as diabetes mellitus, diabetes insipidus, chronic Bright's disease.

4. Hysterical diuresis and following severe fright and shock.
5. Very high temperature.
6. In severe sweats.
7. Severe diarrhea, as cholera, colitis, etc.
8. Obstructions to the outlets of the glands, as strictures, stones and tumors.
9. In very old people, when a gland has atrophied, and following a violent suppurative destructive process of the glands.

Like in pyalism, the treatment must first be directed to the cause and only symptomatically may we assist some of these conditions. The use of irritant drugs to the salivary apparatus, as rhubarb, tincture spilaulis, tincture pyrethri, are recommended. The galvanic current by the use of a fine silver probe, introducing one pole into the opening or duct and the other to the cervical region or salivary gland, has been found of service. Internal administration of pilocarpin for a long period is reported to be of benefit.

PAROTITIS EPIDEMICA.

This is a manifestation of a specific infectious disease otherwise known as mumps and usually self-limited; most of the symptoms disappear in two weeks. It may at times be complicated by abscess in the gland, affection of the testes or knee joints. Very interesting is the parotitis secondary to orchitis in the male, and ovarian disease or oophoritis in the female.

The other salivary glands may also be involved in these affections.

Treatment.—Pilocarpin is considered a specific. Local application of ice, tincture of iodine, iodoform and ichthyol colloidion. If abscess forms, early incision is imperative.

SIALODOCHITIS.

Acute infection of the ducts and glands. (Tumor salivalis.)

This condition is frequently seen following acute stomatitis in acute infectious diseases; there is a stoppage of the openings and larger ducts with mucofibrinous plugs and very small seeds, as from poppy, blackberries and raspberries. It may be complicated by suppuration.

The treatment is prophylactic. The mouth should be kept

in good condition, free from such foreign bodies. If they enter, then it is necessary to dilate the opening and express whatever blocks the duct. This is followed by the relief of the symptoms of distention. There are recurrent attacks which must be treated the same way in order to prevent supuration, cyst formation, or abscess.

ACUTE SUPPURATION OF THE SALIVARY GLANDS AND DUCTS,
ABSCESS.

This condition frequently follows the acute infectious diseases of the severer forms, particularly typhoid fever, scarlet fever, measles, pneumonia, erysipelas, puerperal sepsis, pyemia, small-pox, cholera. Again after ovariectomy severe cases have been observed.

Salivary calculi, dental caries with periostitis of the lower jaw, necrosis of the temporal and parietal bone, chronic otorrhea are frequently the cause of an acute suppuration in the salivary glands.

Treatment.—As in the simple inflammation, the prophylactic treatment of the mouth is very important during the height of the acute infectious disease. Attention should be directed to the chronic conditions present which have been mentioned. As soon as abscess is formed it should be incised and drained or permanent fistula may result externally. In the incision of an abscess in the parotid, it must be remembered that the facial terminal branches may be injured, resulting in permanent facial paralysis; also that the blood supply is very much greater in the parotid than the other salivary glands, and that hemorrhage and thrombosis particularly are possible complications.

PHLEGMONOUS INFLAMMATION OF THE SALIVARY GLANDS.

As a complication to severe infectious diseases and violent acute inflammation of the mouth there occurs such rapid involvement of the salivary glands that they may break down very rapidly and rupture spontaneously externally or within the mouth. The treatment is moist dressing externally, local application of iodine externally as well as the mucous membrane, and early opening of the fluctuating area. These cases are invariably followed by fistula.

LUDWIG'S ANGINA.

This is still looked upon by some authors as a violent cellulitis of the neck, which is primarily an infection of the salivary glands. Of course the treatment is directed to the primary source of infection about the mouth and throat.

SIMPLE CHRONIC HYPERTROPHY.

Most frequently met with in the parotid gland following a severe attack of acute inflammation or associated with chronic lead poisoning. Fatty infiltration into these glands has also been observed. The treatment is by means of massage of the glands, but is usually of very little benefit.

CYSTS AND RANULA.

These conditions may be due to various causes, each requiring different treatment, consequently the causative factors will be considered primarily.

If calculus be the cause and is small, then one may dilate the punctum and express the stone through the natural opening, although this is rarely to be accomplished. More frequently incision is made over the stone and it is removed, either allowing the fluid to drain off and the wound to heal by itself or suturing up the duct.

In case the obstruction is due to a firm plastic exudative plug and obstruction of the outlet, persistent dilatation and expressing the fluid may be followed by a cure; however, this, like the cystic formations following cicatricial obstruction, requires more radical treatment. In the cases where the duct has been converted into a large thick sack, it is necessary to resect a good portion of its firm fibrous wall and establish a new outlet. It is well to employ the cautery, making a good incision and keeping it open by a sound until healing has taken place, the margins of the opening becoming covered by epithelium which cannot close up again. Placing of a silk suture through the entire thickness of the sack close by the natural opening, tying the same very firmly so as to produce necrosis of the tissue within the suture, has been followed by permanent relief. In the case of the sublingual cyst formation it is best to remove the entire cyst, which can be done through the mouth, unless this cyst communicates.

with the thyroglossal duct, when an external operation is required in order to prevent recurrences. In those cases the entire gland is best resected or persistent fistula with infection may be present.

Sometimes the cyst is incised and the margins are sutured to the mucous membrane of the mouth so as to establish a permanent opening.

The injection of a solution of iodine, zinc chlorid and carbolic acid into the cyst wall has also been successfully employed; they are especially recommended in cases where the parotid gland is involved, since operation about this gland is frequently followed by facial paralysis and hemorrhage, with sepsis and permanent fistulæ. If one is compelled to operate on a cyst of the parotid gland, it should be done by blunt dissection, rapidly as possible with incisions in the direction of the course of the facial nerve trunk, namely, horizontally and below the lobule of the ear.

In the case of cyst of the submaxillary gland it is not so difficult, for one may operate from the floor of the mouth or below the lower jaw without injury to any vital structures, even the extirpation of the gland may be performed with comparative ease. Long persistent cyst formation in the glands has been followed by atrophy with secondary absorption of the cystic fluid, an ideal condition to wait for, if statistics could bear this fact out and if secondary infection with abscess and fistula formation did not take place.

There is a form of ranula which has nothing to do with the salivary apparatus, namely, a cyst of the mucous glands; this is therefore not to be considered in this paper.

RECURRENT ENLARGEMENT

of gland without any apparent permanent pathologic condition.

Following the formation of fibrous plugs, which are easily expressed by manipulation, the symptoms entirely disappear. There is a case on record without the presence of these plugs and any other obstruction, claimed to be due to a spasmodic action of the duct near its outlet.

AIR TUMORS IN THE SALIVARY DUCTS.

From excessive blowing up of the cheeks, air enters these ducts and forms a crepitating swelling which rapidly sub-

sides when a small probe or canula is passed into the openings and gentle massage toward them is performed. In one case incision was necessary to let the air out.

CHRONIC GRANULOMAS OF THE SALIVARY APPARATUS.

Actinomycosis, lues and tuberculosis in any stage are very rare and the treatment is based on the general principles of these affections. The one chronic granuloma quite frequent in the glands is the simple chronic infection associated frequently with stone or fistula, and this subject will be treated under a separate part.

NEOPLASMS.

The most frequent benign neoplasms found in these glands, especially the parotid, are the chondromata. Mixed tumors, as myxochondroma, fibromyxochondroma, are next in frequency. In the malignant, the carcinoma is more frequently found than the sarcoma, and when present it is usually of slow growth while confined above the deep firm capsule or fascia of the parotid. Pathologically it belongs to the scirrhus types. In the case of the sarcoma, it is usually admixed with the above mixed forms.

In regard to the management of neoplasms, we must consider (1) benign growths, (2) operable malignant growths and (3) inoperable malignant growths.

1. *Benign Growths.*—If located in the sublingual or submaxillary glands, it is best to remove the gland with the tumor, since the operation is thoroughly facilitated and complications such as infection, fistula, recurrence and malignancy are prevented. When located in the parotid gland, the procedure should be the attempt to remove the tumor without removal of the gland, on account of the location of the facial nerve within it. If some of the fibers of this nerve are within the tumor, then an attempt should be made to dissect them in order to prevent paralysis of that particular branch.

As previously stated, in all operations on the parotid the incision should be made horizontally, parallel to the course of the root and branches of the nerve.

It is recommended that a tongue shaped flap be made with its base toward the zygoma as far down as the angle of the

lower jaw, in order to thoroughly expose the socia parotidis.

In regard to neoplasm of the ducts and puncta, the attempt should be made to preserve as much as possible of the mucous membrane of the mouth in order to re-establish as nearly a normal passage as possible.

2. *Operable Malignant Growths.*—The same rules apply to the malignant growths of the glands, except that if there be any associated enlarged lymph glands they should be thoroughly removed. In the parotid gland it is imperative in the removal of the malignant growth to preserve the parotid fascia, which is a part of the deep cervical fascia; in fact, rather to allow a portion of the tumor to remain, for when once its fascia is permeated rapid metastasis and spreading occur. In case of malignant disease of the ducts, wide excision is recommended, with subsequent X-ray treatment.

3. *Inoperable Tumors.*—Once the deep structures have become involved and secondary metastasis formed the removal of the growth can only be palliative and should be done to relieve severe pressure pains. Usual palliative measures should also be employed, as morphin, X-ray, etc.

SUBLINGUAL GLAND.

(a) Internal method. This may be attacked through the mouth, lifting the tongue, separating the mucous membrane along the floor of the mouth from one side to the other across the frenum. This will expose both sublingual glands. The tumor is then completely exposed, and if suspected to be malignant, or if both glands appear to be involved, both should be removed.

(b) External method. An incision is made along the lower border of the lower jaw two inches on each side of the symphysis menti. The skin and subcutaneous tissue are dissected downwards, exposing the geniohyoglossus muscles, which are severed, thus exposing the gland and tumor. The same rule applies as to removal of one or both glands as laid down in describing the internal operation.

SUBMAXILLARY GLAND.

This region is best exposed by the external route. A curvilinear incision with its convexity downward is made from the angle of the lower jaw to the symphysis menti, the lower

point being on a level with the hyoid bone. This flap is dissected up, exposing a triangle formed by the two bellies of its digastric muscle and lower border of lower jaw. It is necessary sometimes to ligate and sever the facial vessels, although they may simply be retracted. The muscles of the floor of the mouth are now cut, when the gland and tumor will be exposed, dissected and removed. The muscles are then reunited.

PAROTID GLAND.

This technic has been mentioned above, but attention is again directed to the fact that the operation should be limited to the tumor and only that portion of the gland which can be removed without danger to the facial nerve or deep fascia.

CALCULI.

In regard to prophylaxis and preventive treatment, one should have a clear idea as to the etiology of this affection. It is claimed that primarily there is an infection of the ducts, secretions becoming inspissated and deposits of calcium salts occurring. Therefore thorough hygiene of the mouth and teeth, especially in cases of simple stomatitis and that associated with infectious diseases, is necessary. There is nothing in the literature that I could find regarding a solvent, general or local, for these calculi. If a calculus is small and located in the duct, one should attempt to dilate the punctum, eventually introducing some sterile oil or glycerin and expressing the stone through the natural opening of the duct. Again, the punctum may be incised under local anesthesia to facilitate this expression. Probably a more rational and oft practiced method is the incision of the duct over the stone, removing it through this incision by means of forceps and either allow the opening to heal by itself or to insert a suture. Should one or more calculi be located in gland proper, then an attempt should be made to remove it through the mouth if in the sublingual, and externally if in submaxillary or parotid, by incising where stone is felt, in order to prevent infection and fistula. When the stone in the gland has existed for a long time and has caused infection with secondary abscess formation, removal in the case of sublingual and submaxillary glands has been recommended. However, in the

parotid the same rule holds as given in considering neoplasm, namely, removal of stone and drainage.

SALIVARY FISTULA.

Some of the important causes of fistula have already been mentioned, as abscesses, cyst, neoplasm, stones and traumatism.

There is one particular cause of fistula that I would like to mention, namely, that produced in performing facial anastomosis. This is due in many cases to faulty technic in using sharp retractors when pulling the gland forward.

The failure of the fistula to heal spontaneously is due to the pathologic change in the formation of an epithelial lined tract communicating between the secretory gland and the skin.

Owing to the difficulty of curing this condition many methods have been devised, but I shall mention only those which in my experience and judgment give the best results.

In treating salivary fistula one must consider, first, those of the gland proper, which may be of either the parotids, submaxillary and sublingual, and second, those of Steno's (parotid) duct. Of the latter we must consider again whether the fistula is in that part of the duct between the gland and anterior border of the masseter muscles or beyond it.

In the cases of persistent salivary fistula of the sublingual and submaxillary glands, which, after all the causes, as strictures, stones, etc., have been removed, fail to close after cauterization, they should be eradicated by the removal of the glands. The technic has already been described in the subject of tumors.

In fistula of the parotid it is possible only to cauterize or remove that portion of the gland which does not contain any facial nerve fibers.

Fistula of the Duct.—Fistulae from one of the subbranches deeply located or of the duct itself as far as the anterior border of the masseter muscle, must be closed by cautery or partial resection of the gland, since the reestablishment of a communication with the distal end or turning inwards into the buccal cavity is impossible and impracticable. Fistula due to the affection of the distal end gives much more promise for a cure.

An ideal method is to dissect the distal and proximal ends of the duct, freshening the edges and reuniting them. It is, of course, necessary in all cases to see that the passage of the distal end is free and unobstructed. When the distal end appears too short to be united with the proximal, the mucous membrane of the buccal surface may be incised in a crescentic manner in front of the papilla, which will permit approximation.

The dilatation of both ends of the duct and the placing of two fine threads of catgut within the lumen from papilla to the gland will tend to make the saliva flow into mouth and permit closure of the fistula.

Dissection of the duct about the fistula for some distance, attempting to suture about the fistula so as to close the duct and then covering over defect by a suitable skin flap from the cheek is also recommended.

When the proximal end is long enough to be dissected as far as the masseter muscle, then this should be done and carefully sutured into the mucous membrane of the buccal cavity, making the course of the saliva in that direction. The cheek wound may be left to heal by granulation or freshened and sutured, eventually being closed by a plastic flap.

One of the most satisfactory methods to close a fistula is as follows: Pass a double armed silk or wire suture, employing straight needles, from without inwards about the opening of the fistula and let the two ends come out on the inner buccal surface about one-eighth inch apart. By drawing and tying this suture firmly together, all the tissues within it will slough and will turn the fistula inwards. The sloughing channel becomes covered with epithelium. The old site of the fistula is freshened and permitted to close.

Another similar method is to pass a small trocar end canula from the fistula through the cheek obliquely forward and downwards. Remove the trocar end, passing some small India rubber tubing within the canula. The canula is now removed, leaving the rubber tubing for a week or two. The outer as well as the inner ends of this tubing are daily cut off so that the fistula may be closed, making the saliva run along the rubber tubing until a permanent channel is formed, when the tubing is left out.

CASE REPORTS.

CASE 1.—Acute Toxic Parotitis. Mr. O., 34 years old, had a Hunterian chancre five years ago, and was subsequently treated with antisppecific remedies. While taking about sixty grains of potassium iodid three times daily for about a week, he suddenly developed a double facial paralysis, for which condition he was referred to me by Dr. Lieberthal.

Examination.—The facial expression was that of a frozen face; he could not move a single muscle on both sides of his face supplied by the seventh nerve. His conjunctivæ were markedly injected and there appeared to be a lack of salivary flow. Some swelling of both parotid glands, and some difficulty in opening the lower jaw. There was absence of any central or ear lesion to account for this facial paralysis, as well as the absence of any involvement of any other cranial nerves. The chorda tympani was not involved.

Diagnosis.—Acute edema, or inflammation of both parotids, with compression of the facial nerves, most probably due to the potassium iodid. The patient recovered within two weeks after withholding the iodids and the application of a mild galvanic current.

CASE 2.—Recurrent Swelling of Parotid. Mr. H. very frequently, eight to ten times a year, has swelling of the face on one or the other side, followed by chills and fever, and a tense feeling which finally terminates in severe shooting pain about the ear. This condition has been present for the last four years.

Examination During Attack.—On the left side of the face, in the parotid region, is a swelling that is greatest between the angle of the jaw and mastoid tip. The mouth cannot be opened except partially. There is no evidence of pathologic condition in the mouth, but the site of the papilla of the duct appears dry. Attempt at expression of the duct is followed by some thick secretion and some saliva. Cocain and adrenalin and dilatation with sounds are followed by more saliva, but no evidence of any stone.

Treatment.—At first the same procedure was employed in diagnosis, as cocain and adrenalin, expression of the duct and the introduction of sounds prevented the full development of an attack, but subsequently even sounding became unnecessary by the following procedure: As soon as the patient

had the feeling of inability to open the mouth freely, he was directed to use a very hot mouth wash of salt solution, then gentle massage of the Steno's duct, and the application of a solution to the punctum of cocain, two per cent, in adrenalin 1-1000. Last year he had only one attack requiring instrumentation.

CASE 3.—Recurrent Swelling of Parotid. Mrs. C., 48 years of age, has symptoms of the menopause. For the past six months about the time that she should menstruate she has a bilateral swelling of the parotid glands, and at one time the one submaxillary gland was also swollen. Aside from the discomfort of a swollen face, she has no inconvenience from this trouble. In two or three days the entire swelling disappears, regardless of local application or general treatment. The flow of saliva does not seem to be interfered with.

CASE 4.—Ranula. Emma L., 4 years old, was brought to me with a history that during the past two weeks a swelling had developed under the tip of the tongue, more on the left side. This swelling was constantly increasing, causing the child considerable difficulty in speaking, and since the child was a mouth breather, she had some difficulty in breathing. It did not appear to cause the child much pain.

Examination shows a poorly nourished child with bad teeth. On the floor of the mouth, under the tip of the tongue, more prominent to the left, was a smooth swelling about the size of a walnut. It caused the child to hold its mouth wide open and the tongue was displaced upward. The tumor felt tense, but was not painful on pressure. It looked somewhat inflamed. The openings of the sublingual and submaxillary glands could not be made out.

Diagnosis.—Salivary ranula of the left sublingual gland.

Treatment.—The procedure was surgical. Under general anesthesia an incision was made transversely under the tip of the tongue, carrying it farther on the left side. This incision went through the mucous membrane alone until it came upon the cyst wall, which was very carefully guarded from puncture. The mucous membrane was very carefully dissected, and the cyst exposed. In the attempt to free it from its firm attachment to the gland, it ruptured, and a viscid, brownish fluid escaped. The sac was now thoroughly removed and the wound sutured. The result was uneventful.

CASE 5.—Salivary Retention Cyst. Mr. Robert W. Following the scaling treatment of salivary deposits by his dentist, he developed a very sore mouth, and a few days later he noticed a swelling under his tongue on the left side. This swelling very rapidly increased, so that in twenty-four hours it almost filled up the entire left side of his mouth. He had great difficulty in swallowing, and very much pain of a lancinating character.

Examination.—The man had the appearance of considerable prostration, not having been able to take any nourishment for two or three days. A fusiform swelling filled up the entire left side of the floor of the mouth. Considerable tenderness on pressure, and all the mucous membrane has an acute inflamed appearance. The papilla is prominent and swollen, but no saliva comes out nor can it be expressed. He has a temperature of 100°. After cocain and adrenalin application, an attempt was made to pass a fine probe through the natural opening, but it was impossible to do so.

Diagnosis.—Acute stomatitis and plastic closure of the sub-maxillary outlet, with secondary retention of secretion in the form of a cyst.

Treatment.—Through the entire thickness of the swelling a small incision was made and the retained saliva let out. The relief was immediate, but this opening closed and the symptoms rapidly reappeared. The natural opening could not be reestablished, consequently at the site of the previously formed incision the actual cautery point was introduced and an opening made about one-sixteenth of an inch in length. This did not reunite again, and the patient had a rapid recovery.

CASE 6.—Abscess of Parotid. Baby, three and one-half years old, was brought to the clinic on account of a painful swelling on the left side of its face. It had had the mumps a few days before, at which time both sides of the face were very much swollen.

Examination over the parotid region disclosed a swelling about the size of a walnut, which was extremely tender to the touch, fluctuating, and very much injected. Some lymphatic enlargement on the left side of the neck was noted. Temperature, 108° F.

Diagnosis.—Secondary abscess formation in the parotid gland following severe mumps.

Treatment.—Horizontal incision over the fluctuation and blunt opening up of the abscess, when about one dram of thick pus escaped; a cigarette drain was introduced, and within ten days the abscess was healed without any salivary fistula having formed.

CASE 7.—Salivary Calculus. Mr. B., 27 years old. Referred by Dr. Taylor on account of a swelling on one side of the face below the lower jaw, which swelling would not disappear by the simple expectant treatment for a period of two years. It was frequently diminished, but following slight pains radiating towards the neck and shoulder, it would increase to a larger size.

Examination.—In the submaxillary region was situated a swelling the size of a hen's egg, freely movable, and not very tender. The outlet of the duct appeared normal. Passing of the probe revealed no obstruction or stone, and a normal flow of saliva followed the removal of the probe. Elevating the tongue and placing a specially cut celluloid photographic film covered by the usual yellow postoffice paper in the floor of the mouth and taking a radiogram, revealed a calculus within the gland. Another radiogram, glass negative, on the side of the neck, confirmed the diagnosis.

Treatment.—Incision through the mucous membrane of the mouth, exposing the submaxillary gland, showed the stone located in a pocket close to the beginning of the duct. Incising over the site of the stone, it was removed and not sutured. The greater portion of the mucous membrane wound was sutured. There followed a marked reaction in the cellular tissues of the neck with subsequent abscess formation. This had to be opened externally, resulting in a salivary fistula that took seven weeks to heal.

CASE 8.—Neoplasm of Parotid. Marcella De M., 8 years old, had a swelling on the side of her face for about one year, which in the past few weeks had taken on a more rapid growth. It also interfered with opening the mouth to the fullest extent.

Examination.—In the parotid region there appeared to be a tumor the size of a large walnut, not tender to the touch. There was no change in the salivary secretion from Stenson's duct. X-ray negative.

Diagnosis.—Neoplasm or cyst.

Operation.—An incision from behind the ear below the lobule and forward and upward on the face. Dissecting the skin from the parotid, it was found that the gland was not pathologically changed. Working from above downward, it was possible to separate the parotid from a tumor that had its own distinct fibrous capsule, and which was intimately connected with the ramus of the lower jaw and the masseter muscle. The tumor was removed, although not completely, and the wound closed; healing by primary union. The histologic examination proved it to be a leiomyoma or a nonstriated muscle tumor. Some facial paralysis resulted, but this subsequently disappeared.

CASE 9.—Salivary Fistula. Mrs. S., following a radical dissection of tubercular glands of the neck, a part of the submaxillary salivary gland was accidentally removed, and salivary fistula resulted. This refused to heal after several months of cauterization of all sorts. It finally became necessary to extirpate the submaxillary salivary gland, and a cure followed.

CASE 10.—Salivary Fistula. Mr. C. Following the facial nerve anastomosis for cure of facial paralysis, a salivary fistula resulted from the manipulation of the parotid gland by the use of sharp retractors which should not have been used. Daily application of twenty per cent nitrate of silver solution was followed by the closure of the fistula in three weeks.

CASE 11.—Salivary Fistula. Mr. John L. Following an encounter in which he was stabbed and cut about his face, there resulted a salivary fistula, which failed to heal spontaneously, and local application of nitrate of silver, etc., had no effect. Attempts were made to find the two ends of the duct for suture, but owing to the infiltration this was impossible.

Treatment.—A fine wire suture was passed through the fistula into the mouth and twisted firmly, to cause sloughing of the tissues contained within it. In ten days' time the suture was loose enough to be removed, and the external fistula closed.

Endotheliomata are neoplasms that have a tendency to develop in the salivary glands, especially the parotid. These invariably develop into malignant growths.

LVII.

FIBROMA OF THE NASOPHARYNX, WITH REPORT
OF FOUR CASES.*

By W. B. CHAMBERLIN, M. D.,

CLEVELAND.

True fibromata of the nasopharynx are rare tumors, few such cases, as a rule, falling to the lot of any one operator. Ingals, of this society, in a rather careful review of the literature, has reported more cases than any other single observer.

These tumors have their origin from the dense fibrous tissue covering the basilar process of the occiput, the middle lacerated foramen, the under surface of the sphenoid, the first cervical vertebra and the sphenopalatine fossa. Escat, of Toulouse, however, agrees with the view of Jacques, that the origin of all such tumors is primarily nasal, the most frequent site being the articulation of the vomer with the sphenoid, and that the involvement of the nasopharynx is in all cases secondary. He considers the contrary view as due to the fact that the cases as a rule are seen late in the disease or on the postmortem table, when the primary focus can no longer be made out. This view is not held by other observers.

They are hard, dense tumors, richly supplied with blood vessels, and possessing a decided tendency toward rapid growth. Extension is usually in the line of least resistance, though they do not hesitate to invade or erode any tissue, however dense, which may interfere with their growth. The soft tissues of the neck and face, as well as the nose and its accessory sinuses, are frequently involved; while the growth, if unchecked, ultimately invades the skull cavity itself. These tumors are nonmalignant in that they do not form metastases. From their location and because they so frequently invade

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important structures, they are exceedingly dangerous to life and demand destruction or removal. The base of attachment is always broad, though the tendency to form adhesions makes it difficult at times to distinguish where the origin really is. The nourishment, however, is always from the point of original growth and attachment. Frequent and severe hemorrhages are common.

According to Zarniko, nasopharyngeal fibromata consist histologically of dense fibrous tissue with elastic fibers intermingled. Although cells are, as a rule, scarce, there are frequent nests of new formed fibrous tissue rich in cells. The differentiation from fibrosarcoma is frequently difficult. Blood vessels are frequent and often of great size. This description coincides with the histologic findings in the four cases presented.

A striking peculiarity is the fact that the overwhelming majority of those afflicted are males, and between the ages of 10 and 25 years. After the age of 22 or 25 these tumors tend to spontaneously disappear, so that this period is spoken of as the age of immunity.

It is rare that a surgeon has the opportunity of seeing these cases in their incipency, as medical aid is not summoned until more or less distressing symptoms arise. Among the earliest symptoms may be mentioned nasal obstruction and the resulting voice peculiar to it. The anemia is striking, if bleeding has been frequent. As a result of the obstruction the nose is filled with secretion, which is often of foul odor. Dyspnea, dysphagia and deformities of the nose or face belong to the later developments of the growth; while neuralgias may result from pressure on the branches of the trifacial nerve. Involvement of the middle ear is not uncommon. Death results from the anemia due to frequent hemorrhages or from meningitis as the result of the extension into the skull cavity.

The diagnosis in advanced cases is usually easy, from the appearance of the patient. On examination of the nose nothing is at first seen but thick mucopurulent secretion. If the growth is small, one side of the nose may still be free. On removal of the secretion one observes a pale red or pink tumor, very resistant to the probe and often bleeding easily on slightest manipulation. Examination may even give rise to

a severe hemorrhage. On looking into the mouth the growth, if large, can be seen pushing the soft palate forward and extending downward well into the pharynx. Smaller growths are recognized with the postnasal mirror, while their consistency may be determined by digital examination. The exact point and extent of the attachment can in most cases scarcely be determined. As a rule, only the under surface of the tumor can be seen with the mirror, while the growth fills the space so completely that palpation gives little further information.

Fibromata of the nasopharynx must be differentiated, in the first place, from pseudonasopharyngeal polypi. These are the ordinary mucous polypi, so frequently met with in the nose, which have slipped back into the nasopharynx and found there greater room for development. An intermediate stage between the mucous polyp and the true nasopharyngeal fibroma is the fibrous polyp which springs from the margins of the choanæ and the tissues immediately adjacent thereto. In consistency, as well as on histologic examination, it closely resembles the true fibroma. In practically all the reported cases this differentiation from the fibrous polyp is not clear, all fibrous tumors of the nasopharynx being classified in one group, whether they be sessile and arise from the nasopharynx proper, or pedunculated and have their origin from the posterior boundaries of the nasal cavities. This differentiation, however, seems logical in that the prognosis as well as the operative procedure varies decidedly with the character of the tumor. Zarniko calls attention to the following points in the differential diagnosis: (1) The pseudo as well as the fibrous polyp is always pedunculated, the pedicle usually small—the true fibroma almost never. (2) The latter bleeds easily and spontaneously—the former never. (3) The tendency to rapid growth and erosion of neighboring structures is far greater with the true fibroma than with the mucous or fibrous polyp.

The differential diagnosis from sarcoma presents greater difficulties. Both bleed readily, and both involve neighboring structures; sarcoma by extension, fibroma from pressure. Microscopic examination of excised portions must here be resorted to. Fibromata, too, give no glandular involvement, while the enlargement of the cervical glands in sarcoma may

be a striking feature. The histologic examination of an excised gland in doubtful cases may serve to clear the diagnosis.

As before mentioned, these tumors, while nonmalignant in the restricted sense, are exceedingly dangerous to life and demand destruction or removal on account of their location and their tendency to invade important structures by pressure. Lincoln in his exhaustive article, published in 1883, well summarizes the objects of treatment as: (1) The removal of all growths, as far as possible, together with destruction of tissue at the point of origin. (2) The avoidance of accident at, or immediately following the operation. (3) The securing of the least possible external deformity.

The dangers are (1) shock at the time of operation, and (2) hemorrhage during the operation or immediately after. The former danger has been largely minimized or removed by improvements in technic.

Treatment is in all cases entirely surgical and may be divided into the conservative and the so-called radical treatment. The former, or a modification of it, is the treatment practically universally in vogue to-day; while the latter was the practice of the older surgeons, especially those of England, Germany and France. We find no less an authority than Doyen, however, quoted by Delavan, asserting that "he never saw a tumor which could not be removed through the natural passages." In defense of the older surgeons it may be said that the cases seen by them were frequently more advanced, while those seen by the rhinologist to-day are usually in the earlier stages of growth. Dieffenbach, quoted in Koenig's Surgery, in speaking of these growths, says: "Great courage is required to undertake this operation, because the surgeon is almost compelled to choose between one of three conditions: (1) Choking to death during the operation, (2) bleeding to death, (3) not finishing the operation." Certainly such dangers as these are largely eliminated by the technic in use at the present time.

The radical operation involved a preliminary tracheotomy with subsequent removal of the maxilla or other bones of the face. The resulting deformity was frequently frightful, while deaths on the table or shortly after were not uncommon. Above all, the liability of recurrence was in no way minimized by such heroic measures. Lincoln, choosing arbitrarily the

years 1867 to 1883, inclusively, could find only 58 cases reported in literature with 74 operations, three of those reported being his own. In those cases operated by removal of the bones of the face, over 25 per cent died on the table or shortly afterward. There were frequent recurrences. Delavan collected 120 cases in the years 1891 to 1901. In those cases operated by the older methods there was a mortality of 25.9 per cent, with recurrences in 15.4 per cent. In 66 cases operated by the modern method there was not a single fatality. For this change in operative procedure, with its resulting decrease, humanity is indebted in large part to modern specialism.

The modern operation consists of the removal of the growth, when possible, through the natural passages, the nose and the mouth. This procedure is successful in the vast majority of cases. Where the view is insufficient, or when the accessory cavities of the nose are involved, additional space may be secured by splitting the soft palate, removing portions of the hard palate, or by a Denker operation immediately preceding the removal of the tumor. Injections of monochloroacetic and trichloroacetic acid, as well as electrolysis and galvanocauterization, have also been successful in the hands of many operators. These latter measures may also be used subsequent to the removal of the major portion of the tumor with scissors, forceps, and the hot or cold snare. The inclusion of a sessile tumor within the bite of a snare is, however, a matter of extreme difficulty. It is frequently impossible. For this purpose the method and forceps suggested by Ingals are most ingenious, if the hot snare is used. The forceps of Stucky can be used with advantage when evulsion is attempted.

If one accepts the classification of Zarniko, only cases 1 and 4 would belong to the true nasopharyngeal fibromata. Cases 2 and 3 were distinctly pedunculated, and would therefore belong to those classified as fibrous polypi.

CASE 1.—George R., age 21; farm hand. First seen in October, 1908. Complained of increasing nasal obstruction for an indefinite period. The voice was nasal in character, and there was considerable loss of hearing. Examination through the nose showed on both sides a hard, firm mass in the nasopharynx, with apparently no involvement of the nasal cavity.

Examination of the nasopharynx showed a large, pale red mass practically filling the cavity. Its point of origin could not be determined. On palpation this mass was of extremely firm consistency and was not freely movable.

October 25, ether anesthesia. Patient in the Trendelenburg position. Mouth held open with Whitehead gag with tongue depressor attachment. The tumor was attacked with scissors and strong postnasal forceps. A large piece was evulsed with profuse hemorrhage. This was controlled temporarily by packing, when on examination with the finger a second and larger mass was defined. The second mass was quickly evulsed in the same manner. The resulting hemorrhage was frightful, but was ultimately controlled by a postnasal tampon. The condition of the patient was now alarming, necessitating application of heat and infusion on the table. After return to the ward recovery, though slow, seemed at first uneventful. The packing was removed on the third day with no sign of hemorrhage. On the morning of November 6th, twelve days after operation, the patient was up and was examined with the mirror and very carefully with the finger. There was no resulting hemorrhage. Several hours later the house surgeon was hastily summoned to the ward to find the patient almost in extremis. The nasopharynx was again packed and the hemorrhage quickly controlled. The packing was removed on the third day, no hemorrhage resulting. Nine days later, or twelve days after the second hemorrhage, another severe hemorrhage occurred, making the patient's condition indeed critical. The hemorrhage was controlled by packing by Dr. Fox, the house surgeon, but subsequent hemorrhages during the night necessitated repacking with larger tampons. The day following the right common carotid was ligated by Dr. C. A. Hamann, the nasopharynx still being packed. Packing was removed on the third day with no further bleeding. Recovery was slow but steady, and the patient was discharged February 12th. He was seen by Dr. Fox in December, 1910. His health was excellent, and he had gained 40 pounds in weight.

CASE 2.—Boy, aged 17. Complained of left nasal obstruction for past year—some deafness, but no history of suppuration. On nasal examination a dense, firm mass was seen blocking the left nares and encroaching somewhat upon the

right. The mass was readily seen with the mirror, and on palpation was firm and resistant, but very freely movable. It was easily removed under ether anesthesia by the cold wire snare—the snare being introduced through the nose. The tumor mass was distinctly pedunculated, the pedicle being small. Recovery was uneventful.

CASE 3.—Laborer, aged 28. Complained of complete obstruction of the right nares and partial obstruction of the left for past eight months. During this period the voice had been markedly nasal in character. A snap shot diagnosis of nasopharyngeal fibroma was made from the patient's voice and facial expression. On examination of the right nares much thick, purulent secretion was removed, after which a dense, pale red tumor mass was seen projecting forward from the nasopharynx. There was no mass visible on the left. With the postnasal mirror the growth was readily seen at about the level of the soft palate. On palpation it was hard, firm and apparently pedunculated. This case passed out of my hands and was later operated by a colleague, Dr. I. A. Tripp, to whom I am indebted for the following. Removal was accomplished by means of evulsion through the mouth, a Peters snare being used. The origin was evidently from the middle turbinal, a large portion of which was torn away with the tumor. This tumor measured 6 cm. in length by 4 cm. in diameter. Bleeding was profuse for a few minutes, but soon subsided. The nasopharynx was not packed. There has been no recurrence of the growth.

CASE 4.—Howard P., school boy, aged 10 years. Gave a history of increasingly difficult nasal respiration for past eight months, until breathing was only possible by mouth. He was fairly well nourished, with an expression suggesting adenoids. On examination there was considerable thick mucus blocking both nostrils. On removing this and contracting the turbinates with adrenalin, a firm, resisting, pale red mass was disclosed, completely blocking the right nares posteriorly. There was some encroachment on the left side. With the postnasal mirror a growth was seen situated largely on the right side, but extending over to the left. It was smooth in contour, nonpedunculated, and apparently about the size of an English walnut. Its point of attachment could not be made out. On palpation it was firm, resistant and not

movable. Operation occurred on the day following. Anesthetic and position were the same as the previous cases. Preliminary to the operation the right external carotid was uncovered and two ligatures placed around it, but not tied. The growth on account of its firm attachment could not be evulsed, but was removed piecemeal by biting forceps introduced into the nasopharynx through the mouth, as well as through the right nostril, the index finger of the left hand in the nasopharynx serving as a guide. All growth was removed until the nasopharynx seemed clean and free. The hemorrhage was not profuse, but the nasopharynx was packed. The ligatures on the external carotid were now removed and the wound closed, healing promptly by first intention. Unfortunately at this first operation there was considerable laceration of the soft palate, necessitating repair. Packing was removed the day following.

The patient left the hospital on the fourth day in good condition. On examination at the office some days later, while the nasopharynx was fairly free, a considerable mass was made out in the right nasal fossa. Repeated operations have been performed since—September 26th, November 21st, January 28th, and April 29th, when the last operation was performed. There have been occasional attacks of otitis media with spontaneous rupture of the membrana tympani. The ear is at present dry. Subsequent to the last operation the growth was cauterized through the right nasal fossa at weekly intervals. Although there was some shrinkage, these attempts were ultimately given up on account of the intractability of the patient and the increasing difficulty of producing a satisfactory anesthesia. Cauterization and electrolysis under general anesthesia have not as yet been tried.

At the last operation the erosion of the sphenoid and basilar process of the occiput seemed greater than at previous times. There was also some apprehension lest the forceps at one time had entered the skull cavity. The outcome and treatment of this case are subjects in which I wish to elicit your interest. Can the patient continue to be subjected to operations four to six times a year until spontaneous resorption occurs? A so-called radical operation is out of the question. Whether the growth could be more completely removed through the added space secured by a preliminary Denker operation and whether

the patient could withstand such an operation seems doubtful.

For the histologic examination on these cases I am indebted to Dr. O. T. Schultz, assistant professor of pathology in Western Reserve University. His report is as follows:

CASE 1. The stroma is very dense, due to the marked production of intercellular fibers. The stroma nuclei are narrow, compressed and widely separated. Blood vessels are numerous; most of them are thin walled and some are quite wide. The larger arteries are thick walled. In the superficial zone of the tumor the blood vessels are particularly numerous and the stroma is not so dense as in the deeper areas. The tissue immediately beneath the epithelium is rich in small lymphocytes. In the superficial portion of the tumor there are several areas of hemorrhage. The tumor shows no degenerative changes except a moderate hyalin degeneration of the thickened walls of the arteries.

CASE 2. The stroma is more cellular than that of Case 1. Blood vessels are numerous, but thin walled, not cavernous, and not so prominent as in Case 1. Several obliterated arteries are present. The stroma nuclei are numerous, spindle shaped and vesicular. Development of intercellular fibers is less marked than in Case 1. The typical fibroma structure extends directly to the covering epithelium.

CASE 3. The stroma is soft and fairly rich in young spindle nuclei. Intercellular fibers have been only very slightly developed, the tissue in general looking somewhat myxomatous. The tumor is well supplied with blood vessels, of which a few are wide, thin walled and cavernous; there are a few very thick walled arteries; most of the vessels are narrow and compressed, with numerous spindle nuclei just outside the endothelium. About some of the vessels lymphocytes are present in moderate numbers. The tissue shows no degenerative changes.

CASE 4. The stroma is very dense, like that of Case 1. The narrow condensed nuclei are widely separated by well differentiated fibrous tissue. Blood vessels are numerous and fairly prominent because of the development of their walls. Some are quite wide and dilated. The artery walls are very thick and rich in nuclei. Immediately beneath the epithelium the stroma is not quite so dense as it is deeper down.

Summary.—The four cases show the characteristic, typical, fibroma structure. Common to all are the cellular poverty and

the predominance of intercellular substance, the absence of degenerative changes in the stroma, the richness in blood vessels and the proliferative changes in the walls of the larger arteries. Cases 1 and 4 are very much alike and show the greatest density of stroma, due to differentiation or development of intercellular fibers. Case 2 is more cellular than either of the two just mentioned; the larger number of nuclei is associated with a corresponding lack of differentiation of fibers. In Case 3, although the stroma nuclei are widely separated, the intervening tissue has undergone little differentiation and has an almost myxomatous appearance. None of the tumors are cellular enough to suggest the slightest possibility of sarcoma.

In the foregoing cases I realize that I have contributed little that is original. The use of the Whitehead gag with tongue depressor attachment and the Trendelenburg position I have not seen referred to in the literature. Both I consider a decided advantage. The Trendelenburg position furnishes an excellent survey of the field and certainly reduces to a minimum the possibility of aspirating blood into the larynx or trachea.

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SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOTOLOGY.

Meeting of April 14, 1911.

Vest Pocket Head Lamp.

DR. HAROLD HAYS. This midget headlamp (see cut) was presented as a practical light which could easily be carried in



the vest pocket. It is portable, compact, simple and inexpensive. The complete instrument ready for instant use measures three by one and one-quarter by one-half inch and weighs only five ounces. The brilliant illumination obtained from this little lamp is made possible by a carefully worked out combination of a metal filament lamp, a high efficiency battery and a strong condenser lens. By a simple adjustment of the lens the brilliancy of the field of light is intensified as its area is reduced. Since the source of light is in the same plane as the eyes no shadows are cast. For ordinary examinations the lamp is worn

on the forehead. For examination of the eyes with the ophthalmoscope, the lamp is placed on the left side of the patient's head with the light facing forward. For such examinations the lamp is ideal.

The lamp consists of a battery contained in an oval metal casing supported on the forehead by an ordinary leather head band, and a low voltage, high efficiency lamp fitted with a powerful condenser lens. There is a ball and socket joint fastened to the lower side of the casing so that the lamp can swing in any direction; and being of light weight will remain at the desired angle.

Paper: Six Cases of Acute Suppurative Otitis Media in One Family: with Remarks on the Complications.*

BY HAROLD HAYS, M. D.

DISCUSSION.

DR. KENEFICK said that it was a most interesting series of cases, particularly the one that had such marked tenderness over the mastoid, which disappeared after a simple paracentesis and subsequent treatment, as it shows what may sometimes be accomplished by proper palliative and expectant measures.

DR. EAGLETON was especially interested in the case which was complicated by erysipelas after the mastoid operation. He has not heard much of it, since John Hopkins is the only hospital he knows of which denies having had a case. Excepting that one, in every hospital that he had been to there has been a larger proportion of erysipelas than occurred in hospitals devoted to general surgery.

DR. JOHN HORN said that he had seen only one case of erysipelas in quite a number of mastoid cases. That one occurred two days after the operation, but did not involve the side that had been operated upon. It did not interfere at all with the dressing, and the patient made a good recovery.

DR. GEORGE E. DAVIS thought that there was undoubtedly a significance in regard to the infection of the series. With the exception of the brother, who developed his case on the way down, the other cases seemed to develop within ten days or two weeks after association with an infected case. It is

*See page 633.

possible that many of these cases come from an infection, and this would suggest more care of patients so affected, and isolation from others, especially in private families.

Referring to the case with erysipelas, he cited the case of an infant in the Islip Hospital, who was operated upon for an acute mastoiditis. For five days the temperature remained normal, and then shot up to 105° , and an erysipelatous patch appeared in front of the ear, which spread over the face, forehead, and scalp, the inflammation being very marked. This continued for four or five days. In the meantime, there were some intestinal disturbances, and the temperature dropped down and remained normal for four or five days; then, apparently without cause, there was a reinfection, and the eruption spread quite rapidly, and about the fourth week the patient died from the erysipelatous infection during the second attack. Dr. Dwyer saw the child, made an examination of the pus, and used the Hiss extract, but it did not have much effect on account of the feeble resistance of the patient. The baby had had an attack of dysentery a few weeks prior to the mastoiditis.

DR. DANZIGER said that there seemed to be no doubt but that the infection of influenza was the cause of the disease, but it seemed peculiar that five cases should occur in one family. There seems to be little doubt that certain families are inclined to certain diseases, which may be due to an anatomic predisposition. It hardly seemed possible that all the family should have had otitis media without some predisposing cause, which might be the arrangement of the eustachian tube, for instance. There must be some idiosyncrasy to account for it.

DR. HAYS said that they excluded their own hearing by being conscious that they could not hear a watch. In these acute cases that seems to be sufficient evidence that the hearing is in a bad condition. They appreciated their improvement in hearing in the same way. All of them could hear a watch now at a distance of twenty or twenty-four inches—which is pretty fair under the circumstances.

He had presented this series for several reasons, and was particularly desirous to hear from the members whether they thought the infection proceeded from one patient to another, or whether it was purely a coincidence. He himself thought it was more or less of a coincidence. He could understand

how six members of a family could develop influenza, but it was very unusual for six members to develop otitis media.

In regard to the patient with the mastoid who ran a peculiar temperature afterward, he had hoped that some one would offer an explanation. He had seen several cases at the New York Eye and Ear Infirmary which could not be explained in any way. The patients would run a temperature from 103 to 105 for a week or so, and in one case the examination showed an enlarged spleen and some slight tuberculosis of the lung, but there was nothing that would account for the high temperature. In one instance a patient had showed a leucocyte count of 15,000, but after a short time this subsided and she left the hospital perfectly well, and they had never been able to decide what was the matter with her. In the instance reported this evening, he hesitated to believe that the patient ran a temperature of 105 every day for two weeks, on account of the small area of infection in the mastoid wound; although it broke down the second day, and there was a small oozing of mucopurulent material. Another fact might be considered: She went on for five days without temperature, and then it rose to 105 again; then it was found that there was a sanguinopurulent discharge from the nose and frontal sinus. Of course they may have been infected before, and her severe headaches may have been due to that.

These cases should be studied more carefully, and an attempt should be made to classify them in some way. Often in these mastoid cases one sees an erysipelas which cannot be directly connected with the wound. In this case the patient developed the erysipelas under the zygomatic region, and it never touched the mastoid wound at all. Of course there may be a streptococcus of a peculiar form which may give rise to an erysipelatous infection.

He had operated on another patient at the New York Eye and Ear Infirmary, the operation being followed by an erysipelas. It was afterward learned that this patient had been operated upon before, and that time also the operation was followed by erysipelas. It is possible that some patients may have an idiosyncrasy of that kind.

**Paper: A Consideration of Certain Surgical Problems Presented in
the Operative Treatment of Intracranial Complications
Following Aural Disease.**

BY WELLS P. EAGLETON, M. D.,

DISCUSSION.

DR. HURD said that the paper was too able to admit of discussion. It is a very serious thing to tap the lumbar region in cases that show considerable intracerebral pressure, for it is liable to cause respiratory paralysis, as that center will be driven down through the foramen magnum by the pressure above when the pressure in the spinal canal is released by lumbar puncture. This is especially true with lesions in and about the cerebellum. The tapping of the lateral ventricle is more feasible where it can be done.

DR. DANZIGER said that he had had occasion to operate upon two brain abscesses within the last 14 months, both temporo-sphenoidal abscesses, both favorable, with a fistula leading through the dura into the brain. The first was drained by a hard rubber tube, but encephalitis followed and the patient died on the 13th day with symptoms of meningitis. In the second one, after having read an article on a series of brain abscesses, he tried to insert a strip of iodoform gauze into the opening of the abscess. He would like to see anybody do that. As soon as the pus is emptied the cavity collapses and there is no opening left.

He thought that in both these cases it was the drainage that caused the fatal termination. The idea of not draining an acute abscess seems to give the patient a better chance than drainage.

DR. HAYS remarked that Dr. Eagleton had stated that he had been unable to decide whether he preferred ether or chloroform in these operations. He said that he did not think it made any great difference which one was used and that in many instances very little of either had to be given. He thought that the point of greatest importance in these cases was the blood pressure, and that a collapse, often attributed to the anesthetic when the dura was opened, was almost entirely due to the pressure, which often fell to sixty millimeters of mercury. It is often advisable in these operations to have an assistant who does nothing but watch the blood pressure from a sphygmometer attached to the arm, as the condition of the pulse means nothing.

Another point of importance is the control of the hemorrhage. He had seen Dr. Elsberg use a little suturing device which controlled the hemorrhage very beautifully. This is done by taking repeated overlapping sutures down to the periosteum, both within and without the line where the incision is to be made. The ends of the two sutures are left long and these ends are tied tightly together. When the operation is over, these sutures may be removed.

DR. DAVIS inquired whether it would not be feasible in draining the spinal canal, when one gets the pressure effect, to devise some method of injecting normal salt solution when there is a hernia at the base of the brain—lift the brain up and the cerebellum too.

DR. HORN said that he had seen a similar method of controlling the hemorrhage followed by Dr. Willy Meyer, and had also seen a death in his practice. He was about to operate, and the patient suddenly stopped breathing; although the pulse was going for some hours afterward and the assistants worked over the patient for a long while, yet he died. He reported a case where he had operated on a suspected cerebellar abscess. A radical mastoid operation was performed, and on the second day the patient seemed to be doing very well, but suddenly stopped breathing, and although the pulse continued for several hours, she died. The brain was removed at the autopsy, and one lobe was almost a shell.

DR. W. M. LESZYNSKY said that while listening to the paper he felt that a great deal had been well said about cranial surgery, with the apparent assumption that the otologist was going to remove brain tumors and undertake general cerebral surgery. In watching operations for otitic brain abscess, it had always seemed to him that it was wise not to do any more traumatism to the skull or brain than was absolutely necessary. The customary method has been to extend the opening from the mastoid to the middle cranial fossa for a temporosphenoidal abscess, and to the posterior fossa for a cerebellar abscess. To make a large bone flap for such a purpose seemed to him unnecessary. He was aware that there was some difference of opinion on this subject. Some surgeons have suggested (particularly those who have done much brain surgery and are not so familiar with otologic work) that it is better to make a large bone flap for such a purpose. To do this properly re-

quires much practice and special skill. He had seen the Hudson drill used a number of times. It is a remarkable instrument. He had been led to believe that there was no danger in using it, and was surprised to hear Dr. Eagleton say that unless very carefully handled it might easily perforate the dura. He had witnessed the death on the table of a patient undergoing operation for otitic cerebellar abscess. He himself had made the diagnosis, and the otologist was operating in the customary manner. Just as the abscess was reached, respiration ceased, though the pulse continued. Artificial respiration was kept up for a long time. In another fatal case that he recalled, artificial respiration was kept up over twenty-four hours. A large opening in the skull relieves the intracranial pressure, and there did not as a rule seem to be any danger to the patient in dispensing with lumbar puncture under such circumstances.

DR. EAGLETON said that he was aware that the paper was not an otologic paper, and yet if the otologist is not capable of going into the skull as well as the general surgeon, he had no business to try to treat a brain abscess. It is just that position which has been spoken of tonight which has kept otologists from doing good work in the treatment of brain abscesses of suppurating otitis media. We must remember that all we know of the treatment of abscess has come not from the otologists but from general surgeons.

MacEwan is a general surgeon, and yet his mastoid work is a part of his general surgery, and is done on the principles of general surgery. It is because Dr. Eagleton is an otologist that he feels that he should either leave brain abscesses alone, or treat them as well as it is possible for them to be treated by any surgeon.

Referring to Dr. Leszynsky's remarks, he said that the otologists as well as the neurologists have made great advances, but that many of the mistakes that he himself has made have been due to the neurologists. He has found that in the diagnosis of brain abscess there are but two classes of men who are of great assistance—the pathologist, who knows the lesion, and the surgeon who has been there and seen it. So, while he feels that otologists should pay attention to the neurologists, they should pay more attention to themselves as otologic surgeons. If the otologists still continue to explore through small open-

ings, as we see in every hospital, making small openings through the dura, we will always have bad results.

DR. BLACKWELL said that while he had been very much interested by Dr. Eagleton's paper, he also was impressed with the fact that most of the doctor's observations had a general surgical rather than an otologic bearing. He believed that the logical point of surgical procedure in these cases of intracranial complications due to aural disease was through the mastoid region, or through the original mastoid wound, rather than from a formal osteoplastic flap located at a greater or less distance above the level or behind the region of the etiologic focus of the complication.

Referring to Dr. Eagleton's remarks on rongeurs, he thought that those we had presented a sufficient variety and were good enough for all ordinary purposes, from the heavy Mathieu down to the smallest Pyle.

With regard to uncovering the sinus, it has been his custom to first remove the subcortical cells overlying that structure with a broad curette. He has such an instrument devised for the purpose, having exhibited and described its use at a previous meeting of the Section. By repeated strokes of the curette the overlying bone can be readily and rapidly reduced to the thickness of ordinary foolscap paper, when with a Pyle rongeur this parchmentlike covering can be easily removed with a minimum risk of tearing the underlying vein wall.

He had been much interested in what had been said about treating an acute brain abscess without drainage, having never heard one advance nondrainage for the acute conditions before.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL,
AND OTOLOGICAL SOCIETY.

SEVENTEENTH ANNUAL MEETING.

ATLANTIC CITY, JUNE 1, 2 AND 3, 1911.

THURSDAY, JUNE 1ST.

SYMPOSIUM—DISEASES OF THE SALIVARY GLANDS.

I. Anatomy and Physiology of the Salivary Glands.*

By R. JOHNSON HELD, M. D.,
NEW YORK.

II. Symptoms and Diagnosis of Diseases of the Salivary Ducts.†

By ROBERT C. MYLES, M. D.,
NEW YORK.

III. Treatment of Diseases of the Salivary Apparatus.‡

By JOSEPH C. BECK, M. D.,
CHICAGO.

DISCUSSION.

DR. JAMES A. BABBIT, Philadelphia, expressed himself as having been profoundly impressed by the papers just presented and called attention to the increasing realization within the last few years of the importance of the salivary glands.

The conditions affecting these structures might be grouped under four heads: (1) Those conditions which involve the salivary glands, per se, viz., neoplasms. (2) Conditions in the oro- and nasopharynx which are secondary to disorders of the glands. (3) Defective stages of metabolism which might be of glandular etiology. (4) Latent infections, causes and effects of which through connection with most important

*See page 655. †See page 664. ‡See page 667.

anatomic structures, may be incident to glandular activity. He has been surprised in tracing hospital records of operations upon the salivary glands to find their comparatively limited number. Among the list were fibroma, carcinoma, lymphoma, keratoma and tumors of mixed type. In forty-five per cent of cases listed in two of the large hospitals, operative procedure resulted in facial paralysis, partial or complete.

Especial emphasis was given to the part which he believed to be played by the various metabolic conditions in the pathology of the salivary glands, particularly the parotid, from its size and anatomic position. He referred in this connection to the propaganda of Horace Fletcher, who, as is generally known, is an enthusiast upon the subject of "salivary digestion" and "salivary activity" as the keynote of health.

Pathologically and physiologically too much emphasis cannot be placed upon the parotid, by reason of its relation to superficial and deep cervical lymphatic nodes, proximity to jugular veins and carotid arteries, and connection with great cranial nerves, particularly the facial. It cannot but be a frequent factor in metabolic pressure and metastatic symptomatology.

DR. THOMAS HUBBARD, Toledo, had seen cases of recurrent parotitis. In one the condition was proven to be due to calculus. During ten years the recurrences had taken place as often as once or twice a month. The submaxillary gland was involved. The calculus, which could be felt by means of a probe, was removed under local anesthesia, with complete relief. In another case, recurrence took place once in about six months. He had also seen a case of parotitis following appendectomy, with rupture into the external auditory canal near the tympanic ring. This occurred about ten days after the operation.

He had operated upon one case of salivary fistula of the cheek, in a child, employing a method slightly different from that described by Dr. Beck. A curved needle, with a small silver wire, was used, and the operation was performed under local anesthesia. The duct was completely encircled, and a double perforated shot was passed over the silver wire and fixed by compression. Daily twisting of the wire brought it through in a very few days. The cure was permanent. The

duct was severed between the fistula and the gland, and it drained thereafter permanently into the mouth.

Referring to the etiology of epidemic parotitis, attention was called to the work of Dr. Elizabeth Herb, of Chicago, who had conducted a series of experiments. She had produced experimental parotitis by injecting into the ducts diplococci from a case of mumps. From these experiments and others, to the number of 200 or more, it would seem quite probable that the cause of parotitis has been definitely determined.

An interesting condition is emphysema of the salivary glands, caused by high tension, as obtains with players of wind instruments, glass blowers and others. Dr. Dorendorf, *Zeitschrift fuer Ohrenheilkunde*, etc., recorded cases in musicians at the post in Freiburg. Permanent dilatation may occur.

The selective action of the diplococcus, or whatever the definite causative agent may be, upon the acoustic nerve should be more carefully investigated, particularly with reference to nerve deafness. He had had four cases of labyrinthitis with permanent nerve deafness, due to epidemic parotitis. The onset of the symptoms are sudden. Two of the patients were children and two were adults. Symptoms of labyrinthitis came on suddenly in the night—nausea, vertigo, vomiting and absolute deafness. In children this is often overlooked; they are not watched carefully enough, and subjective symptoms are soon forgotten. One of these patients, the son of a physician, went several weeks before the family discovered that he was deaf. It was finally noticed by the mother that he did not answer promptly when called, and this was due to the fact that he could not locate the direction of sounds. Hearing was perfect in the other ear, whereas tests proved that it was absolutely lost on the affected side. Vertigo, tinnitus and headache were the prominent symptoms of labyrinthine invasion in this case.

Routine and thorough inquiry by otologists as to the causative relation of mumps to deafness, particularly in all cases of nerve deafness of unknown origin, is advised; and further, the duty of resorting to prophylactic measures in order to prevent this should be impressed on pediatricians. Investigation shows that from two to five per cent of the cases

of nerve deafness in deafmute institutions have been caused by mumps; and more than two per cent of cases of infective labyrinthitis are due to mumps. These statistics should impress otologists that the study of the relation of mumps to nerve deafness is important.

DR JOHN R. WINSLOW, Baltimore, referred to a paper on diseases of the salivary glands, read by him about two years ago before the Laryngological Section of the Medical and Chirurgical Faculty of Maryland. Among others, two cases of salivary calculus were mentioned in that communication. One was that of a young man who had had recurrent inflammation of the submaxillary gland on the left side, for which no cause could be found. After several recurrences a small lump was discovered at the mouth of the gland, and this was clamped with a hemostat and removed by slitting the duct. It proved to be a calculus of the size of a millet seed. In other words, the cause of the inflammation was a movable calculus which, from time to time, became impacted and caused obstruction to the outflow of glandular secretion. In the other case a crescentic calculus was removed from an abscess in front of the larynx. It had formed in the parotid gland and had migrated downward in the tissue of the neck.

DR. GEORGE L. RICHARDS, Fall River, referring to cancer of the salivary glands, said he had made an error of diagnosis in this regard. When the supposed cancer was removed he found at the bottom of it a calculus, which was responsible for the entire condition. The general surgeon and the family physician had concurred in the diagnosis of cancer. Calculi are sometimes easy to find, and sometimes they are not. Two years ago he removed a submaxillary gland in a case in which a piece of straw was the cause of the trouble. The patient had always insisted that he had a piece of straw in the gland, it having lodged there while he was picking his teeth with the straw. He had had three cases in all. He saw Killian do an operation for calculus of the submaxillary gland in a case in which a radiogram showed the exact position of the calculus. It could not be found where it was shown to be. When practically the entire gland had been removed, it was found much higher than had been supposed. When there is swelling, coming on reasonably early, and in a person relatively young, the presumption is against cancer. In such cases calculus can usually be found.

DR. M. D. LEDERMAN, New York City, called attention to the fact that calculi may exist in the salivary ducts without giving rise to acute symptoms. He cited the case of a young man with a rather severe infection of the neck, resembling a so-called Ludwig's angina. He was unable to swallow, the saliva poured over his lips, his tongue protruded, and he had an elevation of temperature. Both submaxillary and sublingual glands on the left side were swollen and tender. The possibility of an infection of a streptococcic nature was considered. The patient said a year or two before he had expectorated some hard substance, but had no local inflammatory symptoms at that time. On passing the finger over the floor of the mouth a hard substance could be felt. Incision was made and a calculus, three-quarters of an inch in length, was found. This had obstructed the sublingual and submaxillary ducts. By milking the glands pus was drained through the incision. The patient made a complete recovery.

The speaker called attention to the universal habit of chewing gum, and suggested that the hyperactivity of secretion caused thereby may have some unpleasant effect upon the function of these glands.

DR. L. E. LOCKARD, Denver, reported a case which he had seen a number of times through the courtesy of Dr. T. E. Carmody.

The patient, a man of twenty-four years, had had pulmonary tuberculosis for two years, when there appeared a hard swelling of the right parotid gland, which was diagnosed as mumps. After one week some softening occurred, and upon incision an ounce and a half of pus was evacuated. This contained diplococci.

Suppuration continued, and five weeks later the cavity was curetted and microscopic examination showed large numbers of tubercle bacilli, but no diplococci.

About this time the right parotid became swollen and tender, and the pus evacuated by incision contained both the diplococci and tubercle bacilli. The diplococcus was identical with the organism of parotitis.

At the end of five months there is still a purulent discharge on the right side, on the left there is nothing but saliva.

DR. GEORGE F. KEIFER, Lafayette, recommended the administration of potassium iodid in cases of dry mouth from

insufficient salivary secretion. He called attention to the possible relation of bulbar paralysis to apparent increase of salivary secretion.

DR. JOHN F. CULP, Harrisburg, emphasized the fact that calculi may exist in the ducts of the salivary glands for some time without giving rise to symptoms. He had had under his care a policeman who had had trouble with one of his parotid glands for about three years. It would swell, become very painful for twenty-four to thirty-six hours, then subside. He was sure that the trouble was due to a calculus; he probed for it, but did not find it. Finally the patient came to him with a report that a hard stone had passed out of his mouth and that he was now all right. He has had no trouble since.

DR. NORTON L. WILSON, Elizabeth, reported a case similar to that mentioned by Dr. Hubby, in which abscess of the parotid gland ruptured into the external auditory canal, except that in his case it followed typhoid fever.

DR. MYLES, in closing the discussion, mentioned an interesting case in which the stone was in the submaxillary gland, and the fistulous tract opened at the glossoepiglottic fold. Immediate action was necessary in order to prevent suffocation. He thought it was a thyreoglossal cyst, but it proved to be a salivary cystic fistula. The cavity was opened and a stone removed. One should be persistent in the effort to make a diagnosis, as these patients suffer much more than might be supposed. When the stone is in the duct, spontaneous temporary relief frequently occurs. Spasm or swelling of the duct closes its lumen around the calculus, shutting in a certain amount of secretion behind the stone, and this causes great distress. When the duct is sufficiently dilated by the retained secretion, the obstruction is relieved and the discomfort subsides.

IV. Direct Laryngoscopy.

DR. E. FLETCHER INGALS, Chicago. The procedure of direct laryngoscopy has not yet come into universal use by laryngologists, the majority of whom favor the older indirect method. The reasons for this are: (1) The necessity for special and expensive instruments. (2) The difficulty of keeping the apparatus in order, especially the lighting system, when it is not in constant use. (3) The time consumed.

(4) The limitations of the method as regards certain cases. These objections far outweigh the advantages in the majority of cases in which inspection of the larynx is made, and in a large percentage of cases where operative measures are to be adopted. There are many cases, however, in which direct laryngoscopy is of great value. In persons with sensitive faces, with thick tongues, with short and thick or stiff necks, this method is often impracticable without thorough local or general anesthesia. The chief indications for direct laryngoscopy are as follows: (1) For the removal of impacted or embedded foreign bodies in the larynx, and the recovery of those that are in positions inaccessible by the indirect method. (2) For diagnosis of laryngeal conditions in infants and children with whom the indirect method cannot be employed, as in the presence of papillomata, stenoses, malformations, etc. (3) For the inspection of certain parts of the larynx or trachea that are more or less invisible by means of the mirror, and for the treatment of lesions in such localities. (4) When a better picture of a condition is desired than can be obtained by the indirect method.

The chief contraindications are: High-grade dyspnea from various causes, uncompensated heart lesions, aneurism of the aorta, myocarditis, arteriosclerosis of considerable degree, conditions causing high blood pressure, extreme weakness, severe hemoptysis.

Preparation of the patient consists in abstinence from food for six hours and from drink for two or three hours previous to examination.

The position of the patient is the upright or recumbent, the latter being better, perhaps, in children, because they can thus be held better.

The instruments required are the open tube laryngeal speculum, or long tube, with spatula end.

Atropin and morphin given two hours before the operation lessen the secretion and quiet the patient.

Edema of the larynx is to be guarded against after the operation, especially in children. Tracheotomy may be necessary. The croup tent is of value in the aftertreatment of these cases.

V. Endoscopic Treatment of Asthma.

DR. WOLFF FREUDENTHAL, New York, referred to his efforts for the past three years in the treatment, endobronchially, of various diseases, such as chronic bronchitis, pulmonary tuberculosis, and especially asthma. The present communication dealt solely with this method of treatment in cases of so-called essential asthma, otherwise known as bronchial or reflex asthma. The etiology of this form of asthma was briefly discussed. Four cases treated by the endoscopic method were detailed, and seven others mentioned. Out of the total of eleven cases treated endobronchially, eight can be considered cured, three greatly improved, and two not benefited at all. It would appear that these data compare favorably with the results obtained by other methods.

In all the cases bronchoscopy was employed under local anesthesia, the patient being kept in the upright position. The treatments were given in the morning, the patient's stomach being empty. Some pain always followed bronchoscopy, in some cases lasting three or four days, in others only a few hours. The treatments were given repeatedly and occasionally many times before the patient was pronounced cured.

The author was convinced, from his repeated endobronchial examinations, that there are asthmogenous points in the bronchi as well as in the upper respiratory tract, and that by attacking these points directly by topical endobronchial applications the foundation is laid for a new means of combating and conquering bronchial asthma.

DISCUSSION.

DR. RICHARD HALL JOHNSTON, Baltimore, said the straight method of direct laryngoscopy is particularly valuable in infants, young children and adults, under general anesthesia. He never employs anesthesia of any kind in infants and young children, as it is dangerous up to five years of age. The method of procedure is as follows: The little patient is pinned in a sheet so that the arms and legs are practically immovable. He is then placed on the table with the head in the normal straight position. An assistant holds the head while nurses look after the arms and legs. The operator stands at the left of the table, facing the patient, and holds the modified Jack-

son speculum in the left hand. The mouth is forced open, if necessary, and the speculum passed straight down between the incisor teeth. When the epiglottis comes into view, the spatula end of the instrument is hooked around it. Slight pressure upward on the handle suffices to bring the larynx into view. In adults with short, thick necks, the entire larynx is sometimes not seen; in such a case an assistant is told to push the thyroid cartilage back, when in most cases the anterior commissure comes into view. When direct laryngoscopy is performed in the sitting position, the head is extended slightly and turned to the right or left. The instrument is introduced between the bicuspid teeth, the tongue pushed to the side and the epiglottis pulled forward. If the anterior commissure is not seen, the nurse is instructed to push the head forward until a straight position is assumed, when all parts of the larynx are seen. The force required to manipulate the instrument is slight.

DR. G. HUDSON-MAKUEN, Philadelphia, asked whether it is customary to give atropin before the operation, as suggested by Dr. Ingals. In the case just reported by the speaker, 1/200 of a grain of atropin was given. There was not a particle of secretion at the end of the tube during the operation, which lasted an hour. There was no closure of the glottis during the direct laryngoscopy preparatory to putting in the bronchoscopic tube, so that it was not necessary to wait for the larynx to open, as directed by Jackson in his book. He also asked whether the sphincter-like closing of the glottis is always noted. It was with great difficulty that he was able to remove the tube at all, on account of the spasm of the glottis. Perhaps the tube was too large for the glottis in this case. There was a very strong grip on the tube, which came out with a snap.

He asked Dr. Freudenthal whether the operations which he had described were done in his office, and whether the patients were immediately allowed to go home. What anesthetic was used in the last case? Does Dr. Freudenthal recommend a general anesthetic, and the employment of the bronchoscopic method in the treatment of asthma in nervous individuals? Does he consider this so important a method in the treatment of this condition as to warrant the giving of a general anesthetic?

DR. B. R. SHURLEY, Detroit, thought some classification of cases which can be more satisfactorily dealt with by the indirect method should be determined upon. The indirect method is evidently a passing one, which he noted with some regret. Coincidental with the passing of this method, deftness of manipulation is also passing, because this method called for the nicest technic of any in the laryngologic specialty. He had recently encountered two cases of laryngeal papillomata, which he removed by the indirect method. One case was that of a man with a very small mouth cavity, where the indirect method seemed very much better than the direct. He mentioned this merely to emphasize the fact that there are still some cases in which the indirect method is preferable.

In asthma the relief in many cases is in indirect ratio to the amount of secretion which is stirred up apparently by the manipulation. Cocain will very frequently relieve the asthmatic spasm. Iodid of potassium, through stimulation of secretion, is exceedingly valuable. Asthmatic cases may be classified into those which are due to the nasal conditions, those which are of bronchial origin, and those which are entirely of systemic origin. The general use of the bronchoscope is not a proper procedure; it is necessary first to classify the cases before advocating this as a general procedure in the treatment of asthma. The bronchi can be reached by intratracheal injection as well as by the more severe manipulation necessitated by the use of the bronchoscope. Of course, it may be important to investigate by means of the bronchoscope and to determine the nature of any lesion that may be present.

DR. GEORGE L. RICHARDS, Fall River, referring to the question of giving an anesthetic to children in making a bronchoscopic examination, cited a case in which he came near losing a patient. The anesthetic was given and the instrument passed by a member of this society, when the child suddenly ceased to breathe. The tube was withdrawn and breathing reestablished, but the only reason for the child's being alive is that tracheotomy had already been done. No fault in technic was responsible for this unpleasant experience.

DR. THOMAS J. HARRIS, New York, considered tracheotomy of decided advantage. One must reckon, however, with a series of cases in which good results cannot be obtained in

this way; cases in which there is a good deal of ossification of the cartilage, and where the neck is so stiff that the parts cannot be seen without a general anesthetic. In such cases, Burning's contrapressure instrument has proved of advantage. Burning himself has called attention to the use of the instrument with satisfactory results in cases of this class. By this means the larynx is pushed in at the same time that pressure is made outward.

DR. ROBERT C. MYLES, New York, said the peculiar spasm to which the trachea and the bronchi are subjected in asthma is a habit-spasm, due to the constant state of hyperemia of these parts, and a reflex central irritation. He had been experimenting for several years with tracheal and bronchial medicaments, using adrenalin, menthol, carbolic acid, iodoform, and various other agents in liquid albolen as an injection. Marked relief had been obtained at times, due either to the anesthetic effect of the drug, or to the brutalizing of the parts. In chronic diseases of the rhinopharynx and nose, great quantities of mucus flow down the trachea and the bronchi, rendering them more or less immune to foreign agents. This is due to the obtunding effect on the mucous membrane, and this probably partly explains Dr. Freudenthal's success.

DR. FREUDENTHAL, in closing the discussion, presented some instruments used by Ephraim for anesthetizing the trachea and bronchi, and some rare books published in the earliest period of laryngoscopy in Germany.

Referring to the use of atropin, he said he usually gives it in 1/100 grain doses, but had found that it had no effect whatever upon the secretion. It is necessary, of course, to differentiate between foreign body and asthma. He had made a few of these bronchoscopic examinations in the clinic, but they were unsatisfactory. It is better to do it early in the morning, before the patient has had any breakfast.

Anesthol, to which he referred, is composed of equal parts of ether, chloroform and alcohol. As a rule he does not use a general anesthetic. He agreed with Dr. Myles and Dr. Shurley, that the bronchoscope stirs up the secretion, serving as a means of expression of the secretion which is present, and of which the patient cannot get rid otherwise.

Referring to Dr. Shurley's suggestion about a classifica-

tion of cases, he called attention to the fact that he had done this in the paper. He would not, for example, employ this method in a case of uterine asthma.

Answering Dr. Barnhill's question as to how a cure is obtained, he said it is difficult to tell. Surely a single introduction of the bronchoscope could not cure asthma, unless by autosuggestion. He had used it for six, eight and ten weeks, at the same time putting the patient under better hygienic surroundings.

Orthoform or propesen emulsion are indicated where there is superficial erosion. The soreness is thus relieved, and the patient is more comfortable and does not manufacture so much phlegm as usual when the bronchoscope is introduced. In the absence of ulceration or soreness, he used adrenalin, to which he added two or three drops of oleum menthol pip.

VI. Fibrous Polyps of the Nasopharynx. Report of Three Cases, With Exhibition of Specimens.

DR. WALTER A. WELLS, Washington, directed attention to a rare form of new growth, of a wholly different character from adenoids, and presented some very interesting points for consideration with respect to its origin, nature and evolution.

Fibrous polyps in the nasopharynx are comparatively rare, and should not be confused with sarcomatous growths in this locality.

A genuine fibrous polyp occurs, as a rule, singly, and is a large, firm, smooth, opaque growth, made up of dense connective tissue, and attached by a firm pedicle. It occurs almost wholly in children, and most frequently in boys. It is evidently a benign growth, never giving rise to metastasis or glandular involvement, not accompanied by true cachexia, seldom recurring, and apparently in certain cases in later life undergoing spontaneous retrogression.

The various theories concerning the origin of these growths were briefly outlined. Without attempting to decide which of the theories is correct, the author emphasized the futility and insufficiency of the mere clinical observations to decide these particulars. A report based upon a postmortem examination would be much more trustworthy than an opinion based upon rhinoscopy or digital examination.

The ultimate termination of nasopharyngeal polyps, in the absence of surgical intervention, is another subject for discussion.

Calcification, serous infiltration, cystic degeneration, sloughing, sarcomatous degeneration, atrophy and retrogression are the various possibilities. These tumors frequently grow to an enormous size, producing dilatation of the nasal fossæ, spreading of the nasal bones and resulting deformity. Posteriorly this expansion causes a forward protrusion of the soft palate and interference with its normal action. Articulation, deglutition and respiration are interfered with, dyspnea and anemia may result from insufficient oxygen, the patient may suffer from dysphagia and become emaciated, and serious hemorrhage may occur at any time. Immediate removal of the growth is imperative under such circumstances.

The methods for the removal of nasopharyngeal polypi may be classified as follows: (1) Those in which access to the tumor is obtained by some preliminary cutting operation, and the growth then removed through the artificial route thus created. (2) Those in which the tumor is treated or extracted through the natural passages, the nose or mouth.

The crude methods of treatment advocated and practiced by many surgeons are attended with serious consequences, the radical, mutilating operations are apparently unnecessary. Electrolysis, the cautery snare and ignipuncture are open to serious objections, as are likewise the various caustic agents.

The author advocated the use of a heavy wire snare, so constructed that great force can be employed. With a little ingenuity it is always possible to manipulate the wires to engage the growth close to the place of attachment, so that the tumor may be removed in toto. A clean severance of the tumor without injury to the surrounding parts, without shock, without hemorrhage and without subsequent sloughing, are the advantages claimed for this method. Recurrence is no more frequent after its use than from other methods. In three cases cited this method was successfully employed.

VII. Four Cases of Nasopharyngeal Fibroma.*

BY WILLIAM B. CHAMBERLIN, M. D.,

CLEVELAND.

DISCUSSION.

DR. HARMON SMITH, New York, called attention to the frequency of error in hospital records with reference to the cases under discussion, many cases which are called intranasal fibromata being in reality myxomata. He recalled three cases which had been treated by injections of monochloroacetic acid, two under his own direction and one under that of his chief of clinic, Dr. McPherson. All of them made perfect recoveries. Seven years ago he had modified Coffin's syringe by making the needle longer, so that the acid could be injected deeper into the tissues. He protected the needle by a jacket which concealed the point until the location for injection had been reached, when at the will of the operator the needle could be unsheathed and inserted into the tumor. When the injection had been made, the sheath could again be run into place before its removal and the cuplike end of the sheath would catch the excess of acid that might exude upon withdrawing the needle. The sheath protected the soft palate and adjacent structures against injury from the needle while in the act of reaching the tumor. It worked well. In another case with Dr. Charles H. Knight, the first attempt to remove the growth was unsuccessful. The screw of the snare broke, and for a while it seemed that they would be unsuccessful in disengaging the snare loop, but by main strength of a surgeon present the wire was drawn through the growth and it was completely removed. The case recovered. The operation was followed by considerable hemorrhage. It seemed to him to be inadvisable to do the major surgery formerly resorted to in these cases. There is just as much danger from radical surgery or from the wire loop as from the manipulation of the acid. If shock from a major operation, and the dangers of hemorrhage, can be overcome, one is justified in resorting to radical surgery.

DR. D. J. GIBB WISHART, Toronto, said his experience with the cases under discussion is extremely limited. They do not seem to be very frequent in a northern climate. In operating

*See page 683.

upon these cases one could not afford to confine oneself to any one line of procedure. It is necessary to determine the point of origin of the growth as well as that to which it has extended, and proceed accordingly. Where the growth has extended into the sphenoid sinus, for example, or into the antrum, a different line of treatment must be followed from that employed where the growth is adherent to the walls of the nasal cavities, pushing downward. If it is in the nasal cavities, it is much more easily removed than when it has invaded the antrum or the sphenoidal cells. In the latter event, one must adopt a radical procedure. When this is necessary, it should be borne in mind that the growth must be removed in its entirety, including the pedicle. Where the growth is adherent to the sides of the nasal cavity, removal is difficult unless a part of the turbinals is also removed. In this event a procedure should be adopted which will give as little scar as possible. Even the radical operation leaves no more scar than was formerly left by other procedures. The absence of scar in a well done Killian operation on the sphenoid is remarkable, and curved incisions on the side of the nose leave very little scar. In the operation suggested by Watson Williams, which none of the speakers had mentioned, a part of the Killian incision is adopted. The side of the nose is laid open and a part of the turbinal bone removed, healing resulting without scar.

In dealing with hemorrhage in these cases, he would feel disposed to open the cricothyroid membrane and to give an anesthetic through the opening, then to pack the pharynx with sponges. He had adopted this procedure in several instances in operations on the nose where great bleeding was to be anticipated.

DR. H. L. SWAIN, New Haven, had had a case similar to number four of Dr. Chamberlin's series. He had great difficulty in saving the patient, who, nevertheless, has reached man's estate without further trouble until within the past year, when he had a terrific hemorrhage. This last he also survived.

It is well known that these tumors are rare, comparatively, and very rare in young girls. The only case he had had among the latter proved to be almost identical with psammoma. No snare would cut through it. He was unable under

general anesthesia to wrench it out by means of large forceps, and it bled hardly a spoonful. It was found to be very poor in blood vessels, with a great deal of fibrous stroma, very much like a uterine fibroma. In this tissue, scattered in smaller and larger masses, were the hard sandlike particles. He had tried to remove another nasopharyngeal fibroma, and he had never seen greater hemorrhage than resulted in this case, except where the longitudinal sinus was cut. Packing through the posterior nares and the injection of salt solution proved successful in saving the patient's life. In another case upon which he operated, the tumor, which was poor in blood vessels, came out very easily. These tumors vary from those which are very easily enucleated to those which are practically irremovable.

DR. JOSEPH A. WHITE, Richmond, cited the case of a boy, eighteen years of age, who had been sent to him by Dr. Robertson of Danville. The doctor had broken all his snares in an effort to remove the growth, and, becoming tired of the case, had sent it to the speaker. The patient had a typical frog face. The whole right side of the nose was filled with the growth, and the postnasal spaces were partly filled. The difficulty was to encircle the growth with a snare at all. His experience had been that no wire will stand the strain in a case of this kind. He used a No. 9 piano wire, turning the nut very slowly, but finally reached a point where it would not turn at all. He surmounted this difficulty by using an iridoplatinum wire. After cutting nearly through the growth by this means, it can be completely removed by the use of the electrocautery.

He never passes a snare through the nose, but always through the mouth. As large a loop as desired may be used in this manner. It is a very simple procedure.

We are all aware of the difficulty in passing any sizable loop through the nose to encircle the growth. To meet this difficulty he takes a very fine child's catheter and puts a wire through it, making a small twisted loop at the distal end. This is so small it can be pressed through any obstructed nostril easily. When it appears in the pharynx, he draws it out of the mouth and fastens the two ends of the wire loop to the small eye in the end of the catheter and pulls it back through the nose. He then passes the two ends of the wire through

the canula of the snare, but before tying it in position he encircles the growth from the back, using his finger to put the loop in position, and when he has drawn it out over the growth he fastens the ends to the snare and proceeds in the usual way to cut through the growth.

DR. LEWIS A. COFFIN, New York, described his method of using the snare tandem fashion in cases in which it had been necessary to surround the growth by a loop entered through the mouth and a stilet snare that could not be threaded sufficiently near the growth to be effective. He had slipped the canula of a second snare over the free ends of the wire, carried it well down onto the growth, and then, threading his operating snare as close up to the canula as possible, and causing the distal end of the operating snare to abut on the proximal end of the first canula, he had a very satisfactory instrument.

He had been successful in several cases with monochloroacetic acid. In one clinical case Dr. McCullagh, of his staff, had removed nearly all of one of these tumors by means of a strong cold wire. Great hemorrhage followed, the patient being almost exsanguinated. The growth recurred, being apparently sessile. He suggested that Dr. McCullagh inject monochloroacetic acid by means of his syringe. This was done over a considerable period of time, the growth was entirely removed, and now, after a lapse of three years, there is no recurrence. He had had other cases in which the same treatment had proved equally successful. In tumors which are cystic, the acid does not act so well. It is difficult to use the needle because of the danger of catching it on the contiguous tissues. The patient must be able to assist by holding the tongue. If the treatment can be carried out it is generally successful.

DR. J. A. STUCKY, Lexington, said since the publication of his article on this subject, seven or eight years ago, he had seen four other cases of fibroma of the nasopharynx. He had never seen a case of multiple fibroma. Three out of nine of his cases were lobulated, but none were multiple. Neither had he ever seen a fibroma which any snare would cut through. He had had Tiemann make a modification of the Jarvis snare, as long and strong as any tonsil snare, and had succeeded in getting the loop over the growth, but despite the

fact that it was kept on for twenty-four hours, and that the nurse turned the nut every five or ten minutes, a point was always reached at which it would not turn. He had taken ordinary plumbers' forceps to turn it with, and every time had broken the snare. Finally, the wire had to be cut in two, the canula slipped off, and the growth ultimately removed with the forceps. He had used forceps in five cases, the forceps being a modification of the old Brandagee forceps. By tying the soft palate back he could get a good view of the growth. He then inserted the left blade of the forceps, then the right, and then locked them. With the mirror he looked to see that he had secured the growth. It is better to tie the carotid artery beforehand, but whether this is done or not, the tampon cord should be inserted through the nostril, with the postnasal tampon ready for use. The growth should be loosened, as a dentist loosens a tooth, before the attempt is made to remove it. He had found that one postnasal tampon will be sufficient, and when this is removed in twenty-four or forty-eight hours there is no secondary hemorrhage.

DR. JAMES F. LOGAN, Kansas City, emphasized the importance of a thorough pathologic examination of the growth previous to operation, in order to obviate mistakes in diagnosis. He had had six cases of nasal tumors of the type under discussion. Two proved to be fibrosarcoma. In each case the report from the first pathologic examination was nasal fibroma, and, after removal of the deeper portions of the growth, the second report was fibrosarcoma in two of the cases. The operative treatment of these two conditions is very different. For the removal of a nasopharyngeal fibroma with a pedicle, not attached to the adjacent tissues, he used a surgeon's chain ecraseur, introduced behind the growth through the mouth. In cases of fibrosarcoma or sarcoma he had made up his mind never to attempt to remove the growth by other methods than electrolysis. One case in which he removed a spindle-cell sarcoma attached to the body of the sphenoid by means of morsellation and the snare, he succeeded in clearing the growth in the nose at the expense of a terrific hemorrhage, even after ligation of the common carotid. It was necessary to transfuse normal salt solution in order to resuscitate the patient. Recurrence of the growth

took place within five months. He refused to operate, fearing that the patient would die on the table. He was taken to Chicago, where an operation was attempted and the patient died before its completion.

A large number of these cases occur in foreigners, principally in those from northern countries.

In two cases in which he had removed the growth by electrolysis there had been no recurrence. In each case he had made three insertions of the electric needle.

DR. GEORGE L. RICHARDS, Fall River, asked if it is not true that there may be a change in character from fibroma to fibrosarcoma. He had had a case referred to him as adenoids which proved to be fibroma. He used the snare in his office, with resulting terrific hemorrhage. He succeeded in stopping the hemorrhage. The patient did not return to him, but he was able to follow the subsequent history, from which he learned that the patient went to the hospital and died in the second year from malignant growth, which was doubtless fibrosarcoma.

DR. LINN EMERSON, Orange, had had a case of this kind in a child eleven years of age, who had already been operated upon for adenoids. He gave calcium chlorid before and after the operation. Under ether anesthesia he could not get the snare around the base of the growth, but by means of the largest Brandagee forceps he twisted it and got it out. Alarming hemorrhage followed removal of the growth, which was controlled by gauze and the finger in the larynx. After four months there had been no recurrence in this case.

DR. CHARLES S. MEANS, Columbus, reported a case of nasopharyngeal fibroma which filled the posterior nares and the vault of the pharynx so completely that he could not use any instrument except the forceps. The turbinates were enlarged and the septum was deviated, so that it was impossible to see or operate through the nose. The patient was a boy fifteen years of age. Breathing was labored, on account of the obstruction, the tumor being so large it filled the pharynx and came in contact with the tongue. It was impossible to get any instrument or wire loop through the nose beneath the soft palate. He therefore seized the growth, and by force extracted it en masse. It proved to have two pedicles, and was large, smooth and very dense. The

pathologist pronounced it pure fibroma. Its dimensions were $2\frac{1}{2}$ inches long, $1\frac{3}{4}$ inches wide and $1\frac{1}{4}$ inches antero-posterior.

Very little hemorrhage followed the operation. There has been no recurrence, after five years.

DR. CHAMBERLIN, in closing the discussion, called attention again to the differentiation between true fibroma and fibrous polypi. Pedunculated growths do not tend to recur, whereas sessile growths do.

DR. WELLS, in closing the discussion, said he could not grasp the differentiation which Dr. Chamberlin had made between pure fibromata and fibrous polypi. The distinction is one of form rather than of nature. To distinguish them from the sessile forms, we designate as fibrous polyps such as are attached by pedicles. His own cases were pedunculated, but pathologic examination has proved that they were purely fibromatous. The pedicles were very tough and exceedingly firm.

Concerning the use of forceps, he believed the reports which had just been made, together with those in the literature, confirm the position which he had taken, namely, that such instruments are to be avoided, and that the snare is the instrument to be used in these cases. Perhaps he had been fortunate in his three cases, but he did not think there are any pedunculated cases which cannot be removed by a snare made strong enough. Any fibrous polyp which can be removed with forceps can be removed with the strong snares now in use.

VIII. Report of a Case of Optic Neuritis Benefitted by Operation on the Sphenoid and the Posterior Ethmoid.

DR. HARMON SMITH, New York. Unmistakable evidences of the favorable outcome of operations upon the sinuses for the restoration or betterment of sight have been furnished by Onodi, Posey, Holmes and others. It may reasonably be concluded that in cases of optic neuritis, where all other causes have been eliminated, operation upon the sinuses will prove successful in a large proportion of cases, provided the neuritis has not extended over too long a period. In cases where the most beneficial results were obtained there was but slight local evidence of involvement of the accessory

sinuses. The author considered it unquestionably justifiable to operate on these sinuses when every other possible cause of the neuritis has been eliminated, even when there is no local or intranasal evidence of the existence of an empyema. Such interference may be justified as an exploratory operation. The mere depletion incidental to the operation will in itself prove of value if the neuritis be due to the pressure of a diffuse inflammation. Pressure, either upon the nerve itself or upon the nutrient vessels supplying the nerve, will occasion visual disturbances, so that relief of pressure, whether it be due to empyema, periostitis or hyperemia from nasal congestion, is the object to be kept in view by the rhinologist. This can be promptly attained only by operation. Milder operative procedures have proved ineffectual in this regard.

The author's method of procedure is to remove the middle turbinate with the cold snare, remove the lower and anterior walls of the posterior ethmoidal cells with forceps and curet, enter the ostium of the sphenoidal sinus with a probe, and curet away the anterior wall from this point downwards, until sufficient space is made to employ sphenoidal forceps, when the entire wall can be removed, or enough of it removed to determine whether there is any necessity for a more radical exposure of the sinus. Drainage is all that is demanded in the majority of cases. If granulations exist it is better to remove them with forceps than to curet the sinus. Postoperative packing will further reduce the granulations present, as well as prevent their recurrence. In the absence of granulations, the author does not use packing, but sprinkles over the denuded area a few granules of thrombokinase, which controls the hemorrhage and does not prevent drainage. The aftertreatment consists in preventing the formation of granulations by the use of fused nitrate of silver on a probe, or cutting them off with forceps, and in keeping the nose clean by douching with some alkaline solution. The eye symptoms should begin to show improvement within a week if the diagnosis has been correct and the operation successful.

Three cases with marked disturbances of vision were detailed, each showing decided improvement in this regard.

He has operated upon a number of cases with lesser dis-

turbances of vision, with good results in the majority of instances. In several there has been no improvement. Upon the whole, however, he felt justified in advocating operative measures for the relief of optic neuritis, in the absence of other known causes, and when there are no contraindications for operation.

DISCUSSION.

DR. LEWIS A. COFFIN, New York, said he had been interested for the past year or so in studying the visual field in the class of cases under discussion, and had had every case investigated from this point of view, as well as the fundus condition. In this connection he had read with interest a late paper by Wallis, of Edinburgh, published in the *Journal of Laryngology, Rhinology and Otology* for May, 1911. Wallis quoted Onodi as saying: "Hinkel treated twenty cases of sphenoidal suppuration without finding anything abnormal in the visual fields. * * * Contrary to the findings of Gruenwald, Ziem, Bryant, Kuhnt and Berger, Henrici and Haffner, in thirty-six cases of accessory sinus disease, found a normal visual field. These facts are to be explained * * * by the varying relation of accessory sinuses and optic nerves. There are two factors that help in the limitation of accessory sinus disease and prevent it from spreading to the optic nerves: the nerves may come into no relation with the sphenoidal sinuses or ethmoid cells, and the wall of the sphenoid may be very thick." Wallis states that "Whilst agreeing with Onodi that the varying relations of accessory sinuses to the nerves and the thickness of the sinus walls are factors to be considered in the production of field affections, I cannot concur in his anatomic explanation as the cause of these conflicting statements. It seems scarcely within the bounds of possibility that certain anatomic relations of the posterior sinuses should occur in the patients of those observers who have recorded field affections, and that certain other anatomic relations should always occur in patients of those who have not found field affections." With reference to the etiology of field affections, Wallis was quoted as saying, "Ophthalmoscopic changes are a far more common symptom in posterior sinusitis than in the anterior, as is to be expected from the close proximity of

the nerve to these cavities. * * * This is explained by the assumption that the optic nerves are directly involved by a toxic substance which has soaked through into the optic canal and orbit from the sinuses."

The speaker did not agree with Wallis with reference to the soaking through of any toxic substance to the sinuses; he did not think there is any toxic principle that acts directly upon the nerve to destroy its function, but rather that this is entirely circulatory. The venous return from the anterior cells is such as not to interfere with the optic nerve, whereas the venous return from the posterior cells is such as to interfere with the venous return of the optic nerve. This gives rise to the edematous condition. This would seem to be borne out by the fact that in disease of the frontal and anterior cells there is edema of the adjacent tissues. On the other hand, there may be orbital cellulitis and edema of the orbital part of the head while the vision remains the same, unless there is great pressure. The idea of this toxic principle must be borrowed from the oculists, who have recognized and described a toxic amblyopia, attributed to alcohol, tobacco, etc.

In discussing Dr. Smith's paper, a brief report of the following case will be of interest, because the patient was not only referred to me for operation by Dr. Harry Friedenwald, but Dr. Friedenwald has kindly given me a complete history of the ocular changes as they occurred:

Dr. Harry Friedenwald's Notes.

"M. Malintourisch, a Pole (age 26), applied on November 29th, 1910, at the Baltimore Eye, Ear and Throat Charity Hospital, complaining that the left eye had suddenly become blind two weeks previously, since which time there had also been headache and some dizziness; no vomiting. The right optic disk was perfectly normal and the vision perfect. The left eye showed an optic neuritis of the choked disk variety with two diopters of elevation. The margin of the disk was completely lost, the veins were markedly dilated and tortuous, the arteries attenuated; numerous flameshaped hemorrhages. There were no other symptoms pointing to cerebral trouble and the patient was very comfortable at this time. His nose was examined by Dr. Worthington, who

found distinct involvement of the ethmoidal cells on both sides. He was, therefore, admitted into the ward of the hospital and given general examination, without eliciting any further trouble. There was no history or evidence of lues."

My own notes (T. C. W.) at this time show evidence of chronic, nonpurulent ethmoiditis, and on the left side a large middle turbinate which completely fills the space between the outer wall and the septum; yellow mucus about middle turbinate.

Diagnosis.—Bilateral hyperplasia of the ethmoidal cells. The patient, who had been on helmitol, was given ten grain doses every two hours through the day and was operated upon on December 1st, 1910, under cocain. The operation was on the left side, and the middle turbinate and ethmoidal labyrinth were removed, together with what appeared to be the anterior sphenoidal wall. The inferior turbinate was likewise removed. There was a free opening into the frontal sinus. I found no pus in the cells or any evidence of necrosis, but the ethmoidal cells appeared to be distended and filled with some firm substance. The cell which I believed to be the sphenoidal contained a few drops of thick yellowish mucus. He recovered rapidly from the nasal operation, and my notes on December 13th state that the nose was almost well. The helmitol was continued for about eight days after the operation.

Further notes are taken from Dr. Friedenwald's:

"There was a marked improvement in the ocular condition after the operation. In three days the neuritis became distinctly less marked. On December 13th the patient could count fingers at a distance of several feet. On December 20th the vision of the left eye had risen to 20/50, and there was marked improvement in the condition of the papilla. The swelling had almost entirely disappeared and the inflammation was very slight. No elevation could be made out. The margin of the disk was becoming well defined. The patient was discharged December 24th cured and with almost perfect vision in the left eye.

"He returned January 5th, 1911, with complaint that the right eye was beginning to trouble him. At this time the left eye appeared perfectly normal and vision 15/20, but the

vision of the right eye, which had been previously normal, was 20/200, and there was now the same picture in this eye which had previously been noted in the left, namely, a marked optic neuritis, but without hemorrhages and not as intense as in the other eye. There were no other cerebral symptoms accompanying the trouble. The patient was again admitted to the hospital, but for purposes of observation only, and was placed upon helmitol so as to reproduce the condition under which he had been placed during his previous stay, but without undergoing the nasal operation. He went through the same course. The inflammation rapidly subsided, and disappeared entirely with complete restitution of vision. He was discharged February 2d, V., R. E., 20/20; V., L. E., 20/30. During his stay at the hospital there were no signs or symptoms of cerebral trouble discovered."

"Note (also by Dr. Friedenwald): The rapid and complete disappearance of the optic neuritis in the left eye following almost immediately after the nasal operation, corroborated the diagnosis first made that the neuritis was due to nasal trouble. The course of the neuritis in the right eye shows that this view was erroneous. It is not impossible that the rapid improvement in both eyes may have been due to the helmitol, which was given in large doses during the whole period of his stay at the hospital."

I can but agree with Dr. Friedenwald's conclusion: That the use of the hexamethylenamin preparation in this case very probably did more for the man than did the operation. The cases of optic neuritis which have been referred to me, with disease of the frontoethmoidal or sphenoidal sinuses, have, with few exceptions, improved or recovered from the eye symptoms after operation, even before the use of hexamethylenamin in sinus disease was known.

DR. WOLF FREUDENTHAL, New York, reported two cases. The first was a man 35 years of age, who consulted him two and a half years ago at the suggestion of his ophthalmologist. He could not see very well on the right side. Examination revealed empyema of the sphenoidal sinus. Radical treatment to prevent loss of eyesight was recommended. The patient disappeared and did not return for two years. When he came back the sight on the right side had entirely disappeared, and on the left side it was materially weakened.

He had had nothing done in the meantime. One year ago the ophthalmologist examined him and found the left eye perfectly well. The speaker removed the posterior ethmoidal cells and the anterior wall of the sphenoidal, and the patient said he was easy in the head for the first time. The suppuration of the sphenoidal sinuses was not yet cured. X-ray pictures showed the sphenoidal cells, an anterior and a posterior cell. He was afraid to go too deep into the sphenoidal sinus because of the danger of entering the cranial cavity. The sight in the left eye is stationary. There is no toxic infection, but pressure upon the nerve.

DR. NORTON L. WILSON, Elizabeth, referring to the question of the possibility of direct pressure producing optic neuritis, called attention to a case which he reported before the Eastern Section five years ago. The frontal and ethmoidal sinuses were involved, and when he performed the Killian operation he found that the abscess had broken through the wall into the orbital cavity, causing pressure upon the optic nerve.

DR. FRANK ALLPORT, Chicago, desired to say that one of the previous speakers seemed to feel that ophthalmologists are not at all accurate in their diagnosis of toxic amblyopia. He desired to say that scarcely any eye disease is so easily diagnosed as that resulting from alcohol or tobacco poisoning. The symptoms, which it is not necessary to give here, are so characteristic that they can scarcely be misunderstood. The connection between ophthalmology and rhinology is extremely close, and is of even greater importance to the ophthalmologist than it is to the rhinologist. There can be no question but that a great many eye diseases originate in diseases of the nose or accessory sinuses. Dr. Allport said that this fact was so well established that it had become a routine practice in his office to have all eye diseases of doubtful origin examined by an expert rhinologist in his office, as to the condition of the nose and accessory sinuses. He does not believe that ophthalmology can be really successfully practiced without a knowledge of the intimate association existing between eye diseases and nose diseases. The ophthalmologist who does not take into consideration this important fact must invariably miss one of the most important diagnostic and curative features of his profession.

DR. SMITH, in closing the discussion, said there might be circulatory disturbances without a purulent condition adjacent, but there could not be a purulent condition present without circulatory disturbances. Referring to Dr. Beck's remarks concerning antisyphilitic treatment, he said all the cases cited had had that treatment. They had had strychnia also. Of course one was inclined to be skeptical about the antisyphilitic treatment unless given individually, but in his cases the condition was progressive and he could not wait long enough to put the patients on antisyphilitic treatment. He had one patient who could see on the day before the operation and who could not see at all on the day of the operation, thus demonstrating the rapidly progressing disturbance. With this progressive condition, where all other possible causes have been eliminated, one should not hesitate to go in and relieve the pressure, no matter to what the pressure was due.

IX. Preservation of the Anterior Wall in the Radical External Frontal Sinus Operation.

DR. THOMAS J. GALLAGHER, Denver. The older operations consisted in the removal of more or less of the anterior wall, with or without enlargement of the frontonasal canal. In some instances the sinus is packed and allowed to heal by granulation. Instead of removing the anterior wall, an osteoplastic flap has been used by some operators, deformity being thus obviated. All these methods are open to the objection that the ethmoidal cells are practically ignored, reinfection being apt to occur and more or less deformity to result. The Killian operation has proved effectual, the only objection being the resulting deformity. In the author's opinion the lower portion of the Killian operation should be performed first, preserving the anterior wall, unless it is found impossible to satisfactorily remove the debris from the sinus from below. He had performed six external operations in which the anterior wall was preserved, the procedure below the arch being a typical Killian. The size and contour of the sinus should be ascertained by X-ray photographs.

DISCUSSION.

DR. H. HOLBROOK CURTIS, New York, said he was the first member to have read a paper on the frontal sinus oper-

ation before the society. He had shown three cases in the 1902 meeting at Washington, in which he had operated through the anterior wall and treated the wound, after curetting and making a wide opening into the nose, exactly like a mastoid operation. The cavity was repeatedly packed until obliterated. Coakley later reported 104 cases done by this method.

Though it was the opinion of the speaker that the operation through the anterior wall was the safer operation, the deformity which resulted led him to seek other methods.

Killian about this time proposed his method of saving the ridge, which in many instances was an ideal operation. Latterly, however, Killian was preserving much more of the anterior wall than at first. Today the external operations are being done entirely too often.

It is very easy to break down all the ethmoid cells and by means of the instruments employed by Ingals, Myles, himself and others, to remove the structures rendered fragile by the inflammatory process and efficiently drain the sinuses. The removal of the middle turbinate, all the ethmoid cells and entrance to the sphenoid is easily done in fifteen minutes after cocaine anesthesia.

Until recent times it was thought necessary to remove the inferior wall of the frontal to do this. The future would show much fewer external sinus operations; there would be hardly any if the specialist got the cases in time.

DR. ROSS HALL SKILLERN, Philadelphia, said the preservation of the anterior wall, as Dr. Gallagher himself states, is not a new one, and it would be merely a useless repetition and waste of time to attempt to apply it to all cases of frontal sinusitis requiring an external operation.

It is the general consensus of opinion that it is inapplicable in the majority of cases, on account of the numerous fistulae which follow.

Von Eichen, while Killian's assistant, in summing up the results of the Freiburg clinic for eight years, laid particular stress upon this point, and has seen many cases of fistula formation after leaving the anterior wall intact; sometimes several years after the operation, which requires subsequent surgical intervention. In certain well selected cases this form of operation may be indicated. I mean those in which

the sinus does not extend high in the frontal bone and is of regular contour. In other words, one in which we can reasonably expect complete obliteration by the ascension of the orbital fat. If recesses and hollows remain which have not been thoroughly reached, failure more or less complete will certainly result.

Ritter (*Deutsch. med. Woch.*, 1906) endorsed this infra-orbital method of sparing the anterior wall, but has since abandoned the procedure after having reported two deaths following its application.

DR. D. J. GIBB WISHART, Toronto, said he was in Vienna when Killian reviewed his cases, some of them having been operated upon two years before they were reported. He had had the pleasure of seeing these cases, and was impressed by the absence of deformity.

DR. WALTER A. WELLS, Washington, cited a case which illustrated the natural tendency of frontal sinus disease to recover. The case presented all the symptoms which urgently indicate radical operation, and he performed the Killian operation, when he found a complete breaking down of the septum. He did not think it wise to do a double operation, but anticipated having to do the other side later. Not only did the side operated upon clear up completely, but the other side also, and there has been no return of the symptoms during the two years which have elapsed since the operation.

DR. GALLAGHER, in closing the discussion, said that he never resorted to the external operation until after the intranasal operations had failed. He believed the lower Killian operation would succeed in most instances, thereby saving the anterior wall and preventing deformity.

X. Accessory Sinus Suppuration in Scarlatina.

DR. THOMAS HUBBARD, Toledo. Nearly all cases of scarlatina having so-called "purulent rhinitis" have sinus suppuration in varying degree of severity. Some die from this cause, many recover spontaneously; and between these two extreme groups there is a class which presents distinct indications for surgical treatment. The very severe type usually die from meningitis or septic thrombosis of the venous sinuses with metastases; and chronic suppuration with com-

plications, necrosis and fistula formation is the fate of those having sinus suppuration of moderate degree of severity, unless aided by timely surgery.

All of the exanthematous diseases should likewise be regarded as initial causative factors of acute and chronic nasal and sinus suppuration; and these cases should be treated by the rhinologist during the acute stage, with the purpose not only to prevent ear infection, but also to prevent sinus empyema, which terminates at best in chronic suppuration. As a general rule, the same surgical axioms apply in accessory sinus suppuration with symptoms of septic thrombosis as are applicable to mastoiditis.

The author reported a case of scarlatina complicated by purulent mastoiditis, the suppurative sinusitis involving the frontal, ethmoidal and maxillary sinuses. Recovery followed operations. Autogenous vaccine treatment was begun on the fifth day after the sinus operation, because of increasing fever, pus, etc. This treatment seemed to establish a decided change for the better, and it was continued into convalescence.

DISCUSSION.

DR. HENRY O. REIK, Baltimore, said he had had the privilege of serving as consulting otologist to the Infectious Diseases Hospital, managed by the Board of Health of Baltimore, and had been impressed here and elsewhere by two features of scarlet fever cases. The first is the ignorance of general practitioners concerning the relationship between infectious diseases and the accessory nasal sinuses. The second is the ignorance of rhinologists on the same subject. The ignorance of the general practitioner is more excusable than that of the rhinologist. The otologist has been hammering away at the subject so long that the men in charge of these hospitals have come to be pretty "keen" in regard to the association of scarlet fever and middle ear disease. They are awake to the possibilities of involvement of the tympanum and mastoid, and do not wait long before either acting themselves or consulting a specialist.

With regard to the nose it is different. The attending physician has not been impressed with the importance of nasal infection in scarlet fever, and has been allowed to believe that if infection occurs it is partly his fault, hence he is less

likely to report it. Infection of the nose is not necessarily the fault of the physician, any more than is infection of the ear, but the text books often lead general practitioners to think so.

It is important to bear in mind how frequently chronic rhinitis of a purulent character or involvement of the sinuses may be traced to scarlatinal infection. In most infectious diseases hospitals scarlatinal cases are not allowed to leave until the purulent otologic condition has been cured. This does not apply, however, to the rhinologic region, patients often being allowed to go out while still subject to a purulent discharge from the nose.

(To be Concluded in the December Number.)

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

Observations on the Upper Tone Limit Both for Air and Bone Conduction.

STRUYCKEN (*Beiträge zur Anatomie, etc., des Ohres, der Nase und des Halses*, Bd. 5, Heft 1, pp. 1), the inventor of the metal monochord bearing his name, reviews his recent work on the use of the monochord in determining the upper tone limit, not only for air but also for bone conduction. The upper limit for bone conduction varies between 17,000 and 26,000 vibrations, and for air conduction between 15,000 and 22,000 vibrations. From this article and many others which have been reviewed during the past two years on this subject, the original claim of Hegener that the monochord would entirely substitute the Galton whistle seems to be coming true.

Horn.

The Treatment of Otosclerosis.

BRYANT, New York (*Beiträge zur Anatomie, etc., des Ohres, der Nase und des Halses*, Bd. 5, Heft 1, pp. 15), shows by his article in the most conservative of German journals that American otologists have some message to convey to our German confreres on this very much mooted question. The article is a timely one, for without question some of the most important advances in otology in the next few years will be made along the line of prophylaxis in catarrhal deafness and otosclerosis. The American school is far in advance of the European, and the consideration which has been given to the recent work of Yankauer, Hays, Holmes, Bryant and others is good evidence of this fact.

Bryant claims that a careful treatment of the nasopharynx, the details of which he gives, and which have undoubtedly appeared somewhere in English, will cause a complete cessation of the otosclerotic process in 90 per cent of the cases. The outlook for an improvement in the hearing is unfavorable in those cases where the patient is almost deaf. In the worst cases he has obtained an improvement for the watch from

0 to 5/150 or even 8/150 centimeters. In more favorable cases, where the deafness is of short standing, the hearing can reach normal again.

Horn.

Neuritis Acustica Alcoholica.

MORIAN (*Beiträge zur Anatomie, etc., des Ohres, der Nase und des Halses*, Band 4, Heft 3, pp. 257) states that there are surprisingly few accurate observations in the literature on this very important subject. The author has been able to collect but eight cases, to which he has added three. All of these observations have been made on clinical data, and with the exception of his own cases the details have been meager. The cases have all been in men, the ages ranging between 20 and 50 years. Generally the patients were addicted to chronic alcoholism. The disease began suddenly; the deafness developed in from a few hours to a few days. In some of the cases there was no previous history of deafness, so that one has a right to assume an acute neuritis. In other cases there was more or less involvement of the acoustic, some due to the patients' calling, boiler makers, etc., so that these cases can be considered as an acute exacerbation. The affection was always bilateral, and the loss of hearing ranged from complete deafness to the hearing of spoken words in contact with the ear. In the worst cases the bone conduction was completely absent, in others very much shortened. Rinné was always positive. The lower limit for sound was somewhat raised, but the upper limit was invariably lowered. The clinical picture was always that of atypical cases of deafness due to the involvement of the cochlear branch. The vestibular branch was also somewhat involved, as was shown by the presence of subjective noises and dizziness. The diagnosis in all of these cases was strengthened by the accompanying symptoms, such as involvement of the optic nerve, amaurosis, central scotoma, paralysis of the oculomotorius and the facial, ataxia of the extremities, etc.

The treatment, total abstinence, etc., gave the following results: 3 cases, a complete recovery of hearing; 3 cases remained the same; 3 cases gradually got worse.

Horn.

Fibrolysin in Otology.

YEARSLEY (*Journal of Laryngology*, May, 1911). Prompted by the various reports of its use in otology, Yearsley has employed thiosinamin, in its improved form known as fibrolysin, in a series of twenty cases of otitis media. Of the twenty cases, seven were males and thirteen females. Three only, or fifteen per cent, were improved. In sixteen there was no improvement, while in one the improvement was doubtful. Two of the cases were instances of postsuppurative adhesion, six were of otosclerosis mixed with catarrh, while the remainder were late stages of chronic middle ear catarrh. In every case other treatment had been made before fibrolysin was used. The drug was used in the form of injections in the arm. The author regards his results as very disappointing, and he has abandoned further trial. From his own experiences, he cannot agree that fibrolysin merits the eulogies that some observers have lavished upon it.

Harris.

Treatment of Otitis Media Purulenta and Mastoiditis in Infants.

PAGE (*New York Medical Journal*, February 11, 1911). In the author's service at the Babies' Hospital, hydrogen peroxid in middle ear diseases has been used with gratifying results. No other remedy has yet been found as efficacious. In eighty-seven cases of acute purulent otitis media, complicating other diseases, only three were operated upon for mastoiditis. Through the winter the ears are examined in every case, and the red and bulging membranes are incised and treated with instillations of hydrogen peroxid and boric acid irrigations from the beginning.

The records of the Manhattan Eye, Ear, Throat and Nose Hospital show the mastoid operation is attended with only slight danger to life when performed on babies in an average state of health. For the year ending October, 1909, there were sixty-eight mastoidectomies, simple and complicated, performed on children under three years of age, with only two deaths following. Early diagnosis to enable early treatment is the all-important thing. In contagious diseases, daily examinations are necessary. A high mortality after operations on the mastoid is more often due to neglect to the ear condition before operation than it is to the operation itself.

Harris.

New Experiments in the Local Anesthesia of the Drum Membrane.

ALBRECHT (*Archiv fuer Ohrenheilkunde*, Vol. 85, No. 3, p. 198). In view of the unsatisfactory results obtained by the present methods of cocainizing the drum membrane for slight operative procedure, Albrecht has conducted a series of elaborate experiments with iontophoresis. Iontophoresis means the carrying into the cells of the body through the intact epithelium of the skin of various materials by the aid of the galvanic current. As the name indicates, the nature of the process lies in the wandering of the ions.

As is already known, in the solution in water of a compound body, as for example salt, not merely are there physical but also chemical processes at work. In addition to the molecules so well known, there is another kind of molecule present, the electrone. These are chemical elements of very little weight, whose electrical force is constant for chemically equivalent masses. The new combination of the electrone with the molecules of the solution is called ions, and is divided according to their positive or negative qualities into kateones and aneones. The formation of the ions means the disassociation of electrolysis in the solution. It is an important observation that the disassociation is in proportion to the concentration of the solution; correspondingly less as the solution is stronger.

Based upon these chemico-physical facts, the author has clinically considered two questions: first, how long an anesthesia produced by this method will last, and what is the best strength of solution to use. He has devised a special handle for applying the current to the drum, and has used the method in twenty cases of chronic middle ear suppuration and in thirty-two of acute suppuration, besides in several cases of furunculosis of the canal. His conclusions are as follows: By the help of iontophoresis we are able to introduce cocain and adrenalin into the drum membrane through the epidermis. The cotton saturated with the cocain-adrenalin solution is connected with the positive pole by means of a specially devised instrument. The instrument is placed under some pressure upon the drum and fixed there. The best solution to use is a 20 per cent cocain solution mixed with a relatively large amount of supranim. The strength of the current varies from 1.5 to 2.0 m. a. In the use of the method for chronic inflammation of the drum membrane, certain difficulties are encountered, such as vertigo

and pain, which are not met with in acute otitis. The chronically diseased drum membrane requires a longer time for anesthesia than that acutely inflamed,—three to four minutes. The anesthesia limits itself to the exact spot where the instrument has been placed. It is, as a rule, so complete that the paracentesis can be carried out entirely without pain. For furunculosis of the canal, the method on account of inability to produce complete anesthesia is not so well indicated. *Harris.*

II.—NOSE.

Prolonged Epistaxis Associated with Increased Vascular Tension.

HAYS (*New York Medical Journal*, March 4, 1911). Hays reports a case of epistaxis occurring spontaneously in a man of forty-five, of good general health, weighing 230 pounds. The hemorrhage was excessive and implacable. It yielded only temporarily to nasal packing and was finally controlled by large doses of morphine and nitroglycerin, administered for the purpose of lowering the blood pressure which, at the onset, registered over 200. Under this treatment the patient finally recovered.

The author calls attention to the difference in the treatment of bleeding associated with increased vascular tension, and that due to local causes entirely. The pathologic change in the ruptured artery at the point of rupture is the cause for the excessive hemorrhage and the prolongation of the symptoms. Indirect pressure by blind packing is the least of the remedies to be applied in such cases. This form of hemorrhage is to be distinguished by its sudden onset, its profuseness, its long duration, its frequent recurrence, the difficulty of control (the usual styptics having no effect), the large amount of blood lost without affecting the patient, and its response to remedies which reduce the arterial tension. *Harris.*

A Note on Turbinal and Sinus Function.

ADAMS (*Journal of Laryngology*, June, 1911). As a result of his studies of the physiology of the nose and accessory sinuses, Adams draws the following conclusions:

(1) The whole mucous membrane of the respiratory tract from the nostrils to the bronchioles is hygrothermic and the chief agent to this end.

(2) The whole nasal mucous membrane is specially concerned in this function.

(3) The sinuses are accessory not only anatomically but also physiologically, more especially during the forced respiration of exertion.

(4) The turbinals, while important accessories to the hygrothermic function, especially during respiration, are probably quite as much directional and regulatory in their action, i. e., they help to regulate the amount and direction of the air-current going to and drawn from the sinuses, and respond to the amount required for the lungs.

His investigations agree with those of Pahlson in regard to the course which the inspired air pursues in passing through the nose, namely, the fore end of the lower turbinal and then between the middle turbinal and the septum and along the roof and down in front of the sphenoid. This applies to quiet breathing. For forced inspiration the air takes the route of the middle meatus also, to the outside of the middle turbinal. Differing from Pahlson, however, he finds that the expired air goes above and below the inferior turbinal. The capacity of the sinuses is twice that of the nasal cavities proper, so that they are capable of storing a fair volume of warm air. When we consider the capacity of the sinuses, their character, their position, their relation to the air-paths, and the shrinking of the turbinals on exercise, it is difficult to avoid the conclusion that the sinuses are chambers for storing the warm, moist air, to be mingled instantly with the inspiratory air, especially on exercise. If the present contention be correct, the ablation of the sinuses cannot be regarded as a triumph of surgery. We should expect a pharyngitis to arise, and for the same reason after the ablation of the inferior turbinal.

Also, the effect of exercise on the turbinals points to one important element in the treatment of what is called "vasomotor rhinitis."

Harris.

The Treatment of Empyema of the Antrum of Highmore, by Means of a Temporary Resection of the Inferior Turbinate.

HIRSCH, Vienna (*Monatschrift für Ohrenheilkunde*, June, 1911), the originator of the method of temporary resection of the anterior end of the inferior turbinate, reviews all the con-

servative operations now advocated for the cure of empyema of the antrum, and concludes that any operation that causes a permanent destruction of any part of the turbinate is to be avoided. The attending atrophic rhinitis, which he claims always follows, is worse than the original disease. His present method is as follows: A vertical incision 1 cm. long is made just in front of the anterior end of the inferior turbinate. A second incision, at right angles to this, is made along the root of the turbinate. The mucous membrane is now dissected away until the free surface of the bony turbinate is seen. The triangular flap is pushed back and the end of the turbinate is freed from its bed with a strong pair of scissors. The remaining mucous membrane on the side wall of the nose is freed and reflected downward. An opening is made into the antrum as large as is necessary. The flap from the side wall is laid into the opening, and the end of the turbinate is sewed back into place by means of the triangular flap. Sixty-two cases have been operated in this way since 1907 with the very best results.

Horn.

Chondroma of the Nose.

SCHWERTFERGER (*Zeitschrift für Laryngologie*, Band 3, Heft 6, 1911) reports this exceedingly rare condition and gives details of the operation, which included a Killian operation, a Denker antrum operation and the opening of the sphenoid, before the growth could be removed in toto. The tumor mass, a pure chondroma, measured 6x5x3 cm. and displaced 35 cc. of water. There have been but eight cases recorded as occurring in the nose and accessory cavities. A complete bibliography and histologic report accompanies the article.

Horn.

Recurrences After the Adenoid Operation.

IMHOFFER (*Zeitschrift für Laryngologie*, Bd. 3, Heft 6, pp. 713) makes a careful study of this most important question, which has been neglected by practically every text book, and which is scarcely ever mentioned in the literature. He divides the cases into two groups: 1. Real recurrences, i. e., the actual growth of new adenoid tissue after the operation, or the enlargement of small pieces resulting from an incomplete operation, which give rise to symptoms of adenoid hypertrophy. 2. Pseudorecurrences, where it is not possible to

demonstrate new tissue, but where the symptoms of an apparent adenoid hypertrophy are still present.

He considers that 3 per cent, the usual proportion of recurrences generally given, as far too small. The causes of recurrences fall under three heads: 1. Recurrences which can be laid at the door of the operator. 2. Recurrences caused by the condition of the adenoid itself. 3. Recurrences caused by the general bodily condition.

This last cause he considers by long odds the most important. As a result of his present investigations he is convinced that the recurrences are not due to fragments of adenoid tissue left behind, but, above all, to the fact that there is present a scrofulcus diathesis. In cases of scrofulosis the adenoid operation is of the greatest value in the ultimate cure, but the disease must be energetically treated after the operation.

Horn.

III.—LARYNX.

Cycloform, a New Analgesic.

ROSENBERG (*Revue Hebdomadaire de Laryngologie*, April 8, 1911). Cycloform is a synthetic product put out by Frederick Bayer & Company. Its chemical composition is l'ether isobutylique de l'acide para-aminobenzoïque. It is a white powder, soluble with difficulty in water. This characteristic renders its local use more satisfactory, inasmuch as the tendency to absorption is less. Rosenberg has never seen a case of intoxication following its use. Baumgarten has gotten excellent results from a mixture of cycloform and corifin in tubercular laryngitis. Rosenberg has employed the drug only in its pure state, and the result has been excellent. When it is desired to apply it to a definite spot in the larynx, injection is the best method. Usually, however, insufflations are to be used. Used in this way, no unpleasant results have been noticed. The analgesic effect usually manifests itself in from five to ten minutes, and seems to increase, at least temporarily, with subsequent insufflations. Some patients have stated that the third application would allow them to swallow for three days without pain.

In addition to employing it in laryngeal tuberculosis, Rosenberg has made use of it in lacunar tonsillitis with favorable effect upon the dysphagia.

Harris.

Ulceromembranous Laryngitis.

MOURE (*Revue Hebdomadaire*, March 11, 1911). Up to recently it was supposed that the affection known as Vincent's angina and dependent upon a fusiform bacillus and spirillum, was limited to the tonsils and pharynx. In 1907, however, Reiche reported a case involving the larynx associated with difficulty in swallowing and paralysis of the right vocal cord. A third case is that of Arrowsmith, reported before the American Laryngological, Rhinological and Otolological Society in May, 1910, and the second case is that of Moure, reported at the Budapest Congress of 1909.

The patient was a man of twenty-two, who had a history of repeated acute affections of the throat including a gangrenous edematous angina of the nasopharynx three years previously, from which he had made a complete recovery. The present attack began in March, 1910, following an angina of scarlatinous nature. Ulcerations were first noticed on the tonsils with repeated bleedings. The bacteriologic examination showed fusiform bacilli and spirilla. When first seen by Moure, the general condition was bad; elevation of temperature, foul breath. Examination of the throat showed a grayish exudate, diphtheritic in appearance, covering the tonsils, the tonsillar pillars and the base of the tongue, resting on an ulcerated area, which bled at the slightest touch. The laryngoscopic examination showed epiglottis red and swollen. The patient complained of severe pain in the lower portion of the throat and difficulty in swallowing. After a temporary improvement the mucous membrane of the larynx began to ulcerate, and was covered with a grayish exudate similar to that on the tonsils. The swelling involved the ventricular bands and the crico-arytenoidal articulations became immobilized. Respiration was difficult; swallowing very painful, so that the patient had to be fed through a tube. The 30th of March, a tracheotomy was performed with immediate relief. During the next few months the condition remained about the same. It was not possible to breathe without the canula; large quantities of spirilla and fusiform bacilli continued to be found in the secretion.

In September he was brought to Moure's private clinic. The general condition was far from satisfactory. Frequent changes of the canula and cauterizing of the granulations were necessary. The condition of the larynx remained the same. There

was no change in the voice. The use of Schroetter's tubes was unsuccessfully attempted. In May, 1910, dilatation of the larynx was commenced by means of sounds carried into the trachea outside of the canula. In spite of a setback, the general condition of the patient improved during the summer, and in the fall of 1910 the dilating tubes had been increased from No. 21 to No. 48.

The case was still under observation at the time of the report.

This morbid manifestation finds its origin either in the larynx itself or in the region in front of the larynx, attacking by continuity the laryngeal cavity, the trachea and even the bronchi.

The symptoms are the same as those when involving the throat. It is noticeable, however, that no fragments of necrosed cartilage are found in the discharge, pointing to the superficial character of the lesion. The local troubles are generally accompanied by symptoms of intense prostration; fever, emaciation, etc. The inflammation shows itself not merely in the infiltration of the arytenoepiglottic folds, but also in the immobilization, more or less complete, of the vocal cords in the medial position, as a result of cricoarytenoid arthritis. A cicatricial form which the disease may assume, leads to an adhesion of the ventricular bands, or the vocal cords between themselves, or a formation of fibrous tissue, such as is seen in other ulcerative conditions of the larynx. Prognosis is very grave.

Treatment.—Moure recommends the washing of the throat with a solution of borate of soda, and the touching of the ulcerated areas with borated glycerin. Internally, chlorate of potash is to be administered in large doses. *Harris.*

IV.—MISCELLANEOUS.

Endobronchial Treatment of Asthma.

FREUDENTHAL (*New York Medical Journal*, June 24, 1911). After reviewing the work done by Ephraim, Horn and others in this field of work, Freudenthal reports four cases, and mentions seven others, of bronchial asthma which have been treated by him with the bronchoscope. Of the eleven cases, eight can be considered cured, three were greatly improved, and two showed no benefit whatever. These data would appear

in his opinion to compare favorably with the results obtained by other methods. The view of the interior of the trachea as well as the bronchi in these affections, was of much interest. In one case there was, apparently, a constriction of the trachea, the whole lumen was swollen and closed, and could not be dilated by cocain. This was no doubt one of those cases of spasm of the trachea due to an irritation of the respiratory center. In all cases the bronchoscope was used under local anesthesia, the patient preferably sitting in an upright position. Some pain followed, lasting in some cases three or four days, in others only a few hours. The duration of the treatment in his cases was longer than those treated by Ephrain.

The author is convinced, as a result of his work, that there are asthmogenous points in the bronchi as well as in the upper respiratory tract. By attacking these points directly by topical endobronchial applications, the foundation has been laid for a new means of combating and conquering this dread disease.

Harris.

A Case of Acute Suppurative Thyroiditis Following the Grippe.

BAHRI (*Revue Hebdomadaire de Laryngologie*, February 5, 1911). The statistics of Galli show that out of forty-four cases of thyroiditis, only two were due to grippe. Bahri's case was a man of forty-two who had always enjoyed good health. Fifteen days previous to first being seen by Bahri, he had been seized by a severe head-cold, with elevation of temperature, cough and general prostration. As the symptoms of this began to mend, he noticed that his neck in the region of the larynx was swollen. This kept increasing until finally there was difficulty in swallowing and breathing. Examination showed a smooth, hard swelling in the region of the larynx, extending to the sternum. Laryngeal crepitation was totally abolished. The larynx mirror showed the two right aryteno-epiglottic folds swollen, as a result of the edema, which extended to the ventricular bands. The patient could not turn his head on account of the pain. Breathing and swallowing were difficult. This condition persisted for a week in spite of local applications. At the end of that time the swelling began to soften, and the patient felt slightly better. An incision was made in the median line and the abscess completely drained. The day following, the interior of the larynx commenced to take on its

normal appearance. The dysphagia and difficulty in breathing disappeared. Examination of the pus showed streptococci. The patient made an uneventful recovery. *Harris.*

A Sou in the Esophagus, Removed by the Modified Kirmissom Hook.

BOTEY (*Revue Hebdomadaire de Laryngologie*, June 17, 1911). The patient was a boy of six, who had swallowed a five centime piece. The radiograph showed its position behind the sternum. The use of chloroform was inconvenient. Botey accordingly decided to make use of the Kirmissom hook, which was introduced without difficulty after cocainization of the pharynx and mouth of the esophagus. The coin was removed on the second attempt by carrying the index finger behind the blade of the instrument along the base of the tongue to prevent the engagement of the coin against the lower border of the cricoid. The author does not regard this procedure in any way a retrogression from esophagoscopy which always demands general anesthesia and previous training. He has modified the instrument by making its diameter smaller and its end more acute, in order to permit of its introduction between the coin and the posterior wall of the esophagus. The instrument is further provided with a scale in centimeters, to assist in exact location. He has also devised a contra-hook for the purpose of preventing the coin from catching against the posterior portion of the cricoid.

He regards the use of the instrument entirely safe, and recommends it in advance of the esophagoscope because of its ease of introduction and its freedom from danger. In case of failure the esophagoscope can then be used.

This is the third case of its kind where he has succeeded in removing the foreign body by means of the Kirmissom hook.

Harris.

A Maltese Cross Fixed in the Esophagus. Failure of the Esophagoscope; Extraction with the Kirmissom Hook.

FOURNIER (*Revue Hebdomadaire*, March 25, 1911). A child of six swallowed, while at play, a maltese cross. The following day she swallowed without difficulty. A radiograph taken a week later showed the cross in the esophagus behind the larynx, in the region known as the hypopharynx. After

several attempts an eight millimeter esophagoscope was introduced but it was impossible to discover the foreign body. Lying as it did in the hypopharynx and wedged behind the cricoid, it was easily hidden between the external surface of the tube and the surface of the esophagoscope, in a region normally obscure and rendered more so by the inflammation following the presence of the foreign body for eight days. The esophagoscope was accordingly abandoned and the Kirmissom hook was used, which seized the foreign body at the first attempt. In order to avoid injury to the larynx, removal was effected by means of the index finger of the left hand being introduced back of the arytenoids, so as to throw the larynx forward. The author does not feel that esophagoscopy is a method to be rejected but that it is not a panacea for all conditions of the esophagus. The case shows further that it is not always possible by direct examination to see a foreign body. The author concludes with a caution in regard to care against perforation in the removal of foreign bodies of irregular contour. In his opinion the Kirmissom hook is particularly indicated in such a case as this. No general anesthesia is required, its technic is simple, and the result certain.

Harris.

BOOK REVIEW.

Diseases of the Ear, Nose and Throat—Medical and Surgical.

By WENDELL CHRISTOPHER PHILLIPS, M. D., Professor of Otology, New York Post-Graduate Medical School and Hospital. Illustrated with 545 half-tone, and other text engravings, many of them original, including 31 full page plates, some in colors. Price, \$6.00. Published by F. A. Davis Co., Philadelphia, Pa.

Dr. Phillips' book is divided into three sections, the first devoted to the ear, the second to the influence of general diseases upon the ear, nose and throat, and the third to the nose, accessory sinuses, pharynx, fauces and larynx. Three hundred ninety-nine pages are given to the ear, nearly 80 pages to the influence of general diseases, and the balance of the book, some 330 pages, to the nose, accessory sinuses, pharynx, fauces and larynx.

This book, which represents the results and experience of many years of teaching, is written in an easy conversational style, as one would talk to a class.

In the section on general considerations, the general therapy of ear disease is discussed with sufficient detail to be a real help, while the drawings which illustrate the incision of the drum membrane are especially to be commended. They really illustrate, and the student ought to be able to do the operation from the description as given.

Blood examinations in acute aural affections are considered to be of value, but not fully determinative. Key plates are furnished for the principal half-tone illustrations, thereby making them doubly valuable, while an occasional clinical case illustrates, and serves to emphasize the points in the preceding description. Every phase of diseases of the ear is discussed, and with due consideration to their relative importance.

A most excellent chapter is devoted to the important subject of external deformities of the ear. The reviewer has not seen as good a one in any text book, or even in any work devoted to cosmetic surgery.

With reference to the indications for the simple mastoid operation, the author is conservative in his view, and says: "It is not wise to operate immediately upon every patient who has tenderness on pressure over the mastoid antrum during the first three or four days of the attack, for the reason that in the milder cases it is quite possible for drainage through the aditus, combined with local absorption, to effect a cure without operation; and, further, it is deemed safer in the interest of the patient to operate after nature has thrown out some protective limitations to the disease within the mastoid cells." So much mastoid surgery has been done in the past few years, some of which perhaps unnecessarily, that a word of caution is not without value. So far as the operation itself is concerned, clear, concise, rational directions, with a detailed explanation of each step, is given. Dr. Phillips very properly objects to the use of the chisel a bit more than absolutely necessary, on account of the danger of shock to the brain, a danger which is likely to be unrecognized when the patient is under an anesthetic, preferring the rongeur. The single incision is advocated, and the right-angled posterior cut, as recommended by Whiting, is not considered necessary. The subject of the plastic, after the radical mastoid, is discussed at length, and illustrations given of all the principal flaps in common use. He believes that the average results obtained from carefully constructed plastic meatal flaps, when anchored in the most favorable location within the wound cavity, are fully equal to those obtained by the employment of skin grafts, and although brilliant results occasionally follow the successful use of skin grafts, he regards the proportion of such cases as inconsiderable.

The complicating lesions of purulent otitis media are well presented, and the complex subject of the labyrinth made as clear as it is possible to do.

With reference to thrombosis, Dr. Phillips takes the conservative view, that even if the surgeon is convinced that a clot is present, it is inadvisable to interfere surgically with the sinuses, provided no symptoms of infected thrombosis have appeared, and he is firmly convinced that noninfected thrombi may develop in the lumen of a venous sinus, which eventually becomes organized into connective tissue, and that to operate upon cases of such type is a questionable pro-

cedure. The conservative treatment of chronic purulent otitis is given with considerable detail, and the indications for operating are rather clearly stated. The author is a moderate conservative in discussing the cases of chronic otitis that need a radical operation, and he considers the prognosis for conservative treatment to be good from the clinical standpoint, when the case is not of long standing, uncomplicated by granulations, the otorrhea is not fetid, and is mucopurulent in character. He opposes the so-called conservative radical operation, considering all such operations as incomplete, since the annular ring and outer wall of the attic and the ossicles, three of the chief centers of necrosis, in chronic purulent otitis, are necessarily left untouched.

The reviewer would question the statement on page 179, with reference to the action of the stapedius muscle. "This muscle receives its nerve supply from a branch of the facial, and it acts upon the head of the stapes by causing the bone to make pressure upon the contents of the vestibule." On the contrary, the action of the stapedius muscle seems to be to cause about one-third of the stapes to press inward on the vestibular contents, while the other two-thirds, at the same time, are drawn outward, and contraction of this muscle will lessen the tension on the labyrinth, and not increase it.

Taken as a whole, the reviewer regards the section on diseases of the ear as one of the best ever written, and representative of the latest practice in every particular. It is one of the first, if not the first, text-books on the ear, nose and throat to have an account of salvarsan and its results in syphilis. Contrary to most text-books, diphtheria is included, as is also the subject of intubation, a detailed description of the technic of which, illustrated by half tone drawings, is given. No theory is advanced as to the etiology of atrophic rhinitis, the author considering that there are many causative factors, and that these vary in the individual case.

The chapters devoted to tuberculosis and lupus are very full, and worthy of careful study. In the section on sinus disease an excellent series of skiagraphs is given. Careful study of these should enable the reader to interpret skiagraphs, since the skiagraphs are practically useless, unless one is capable of properly interpreting them. Hence, the series of skiagraphs are a very important factor of the book.

In operating on adenoids, preference is given Beckman's curette, but the Brandegee forceps is recommended in case one operates with the forceps. The reviewer does not regard this forceps as a proper instrument for the removal of adenoids, and would justify this opinion by Dr. Phillips' own statement. "The closing of the jaws of the forceps does not fully cut through the mass, and one or two rocking movements should be made, with sufficient force to partly cut and partly tear off the adenoids, before it is drawn downward into the mouth; otherwise there is danger of stripping the membrane from the posterior pharyngeal wall. As a rule, it is necessary to complete the removal with the curette or finger, preferably the former." So excellent an instrument as the La-force adenotome, which removes the adenoid entire, without any tearing or injury to adjacent parts, is not even mentioned.

The subject of tonsil hemorrhage is rather slighted, only fourteen lines being given to it, though there are three pictures of tonsil hemostats; nor is any mention made of lactate of calcium as a preventive of hemorrhage. The technic of bronchoscopy and esophagoscopy are briefly described.

The criticisms herein given are purely minor. The book represents an enormous amount of careful labor, and, as a whole, has the entire praise of the reviewer. Practically every disease with which the practitioner of the nose, ear and throat is liable to come in contact is mentioned, while the chapters on general diseases of the ear, nose and throat will be found very profitable for the general practitioner as well as the specialist, both meeting here on common ground. Each division of the book is practically complete. This has necessitated more or less repetition, such, for instance, as hypertrophic rhinitis, which is discussed on pages 484 and 485, and again on pages 646 to 649. For purposes of reference, however, this makes each section a complete monograph.

Ample credit has been given throughout the book to the work of others in the same field, and many illustrations taken from other sources, due credit being always given. The reviewer compliments Dr. Phillips on the general excellence of his work, and bespeaks for the book a large sale. It is one that will be especially helpful to the beginner in the specialty, since the directions are sufficiently clear as to be readily followed. The specialist of experience will find much of inter-

est and profit in the volume, while the general practitioner will find the entire subject of the diseases of the ear, nose and throat properly correlated in their relation to general medicine. This latter feature is especially to be commended, since there has been more or less tendency of late to treat too many of the affections of these organs wholly from a surgical standpoint. Dr. Phillips has viewed the whole subject with the proper perspective, and his general directions as to when the aid of surgery is to be invoked, and when it is not, can be safely followed. The book adds one more to the long list of works that reflect credit on American laryngology.

Richards.

